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TOWARD AN ORGANIC VIEW OF INDIVIDUALITY

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WITHIN the present generation, educational theory and practice have come to lean heavily upon biological data. This relation has increased the stability of progressive programs, but at any time several diverse biological theories may each have their following of educators. That the "growth" concept, for example, is given diverse interpretation by different educators is due in large measure to the kind of biological assumptions upon which the particular educator leans. School method itself follows more or less definitely the teacher's conception of biological heredity and environmental influence. Because of this intimate relation the educator must keep his eye upon biology, especially when changes in interpretation are occurring in that fundamental science. At the present time research in genetics and reinterpretation of the growth process present a new basis for "organic" theories of learning and of individuality. As we move toward a fuller understanding of the new biology's organic view, "creative" education may escape from its overemphasis upon mysterious powers within the child, while the notion of "predetermined" traits and abilities may loosen its grip upon psychology without entirely surrendering to external "conditioning." The biologist leads toward a procedure which is more adequate than a mere compromise between rival theories or an unsystematic eclectic application. Biology now offers education a clearer view of individual achievement processes.

One misconception of individuality has grown out of the belief, widespread among teachers, that particular characteristics of every child are determined "at the moment when the ovum and spermatozoon which are to produce him have united."[1] Although when these words were written

[1] Thorndike, E. L. *Educational Psychology, Briefer Course.* (New York: Teachers College, Columbia University, 1914), p. 2.

they accorded with commonly accepted views, geneticists have now definitely discarded this hypothesis as inadequate. Nevertheless, many a teacher would label as "true" the following statement which assumes the direct operation of particular mechanisms:

"Life begins with the fertilization of the ovum, a microscopic but very complex cell. Contained in the germ cell are certain elements or 'determiners' out of which the various bodily organs and functions develop. Certain determiners grow into certain sense organs, others become particular bones, others become teeth and so on."[2]

In 1923, when the above quotation was published, biological discovery was well on its way toward a thorough-going modification of this assumption. The following year, Jennings called general attention to facts which undermined the theory that particular hereditary elements produced particular characteristics called "unit characters."

"There is, indeed, no such thing as a 'unit character' and it would be a step forward if the expression would disappear. . . . This theory of representative particles is gone, clean gone. Advance in the knowledge of genetics has demonstrated its falsity. . . . It is not true that particular characteristics are in any sense represented or condensed in particular genes."[3]

Thayer, in 1928, pointed out important relations between educational theory and the criticisms being leveled against "unit characters." Especial attention was called to the way in which Thorndike's concept of "pre-formed bonds"[4] and Gates discussion of determiners rely for their scientific standing upon a genetic hypothesis which is no longer in good repute.[5] Thayer concluded that in the light of modern biology "we are hardly in position to speak of *predetermined* connections between situations and responses of thought and action."[6] This means that learning does not consist of exposing prelaid bonds, or even of forming fixed connections which are to be combined later or shifted in accordance with alterations of elements within a situation. Rather, it suggests a new

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[2] Gates, A. I. *Psychology for Students of Education.* (New York: The Macmillan Company, 1923), p. 111.

[3] Jennings, H. S. "Heredity and Environment," *Scientific Monthly,* XIX (September, 1924), p. 228. This article with certain additions has been published in book form entitled, *Prometheus.* New York: E. P. Dutton and Company, 1925.

[4] *Op. cit.,* p. 2.

[5] Thayer, V. T. *The Passing of the Recitation.* (Boston: D. C. Heath and Company, 1928), pp. 78-81.

[6] *Ibid.,* p. 93.

conception of growth and learning in which changes in behavior will be seen as new organic acts achieved *at the moment* in which they occurred,—not as direct outcomes "of the unfolding, innate growth of determiners which existed in the germ cells from the beginning of life."[7] Thus, the teacher's eye kindled by an organic theory will not confine its vision to the accumulation of fixed, narrow responses but will, at least, catch glimpses of the widespread transformations so frequently occurring in each child.

The emphasis upon efficient causal mechanisms, such as genes, has been a valid aspect of the scientist's revolt against teleological mysticism. But Dewey has indicated how the notion that the pattern of an act can be determined at some time previous to the occurrence of that act makes many mechanists really mental brothers of their assumed foes—the teleological philosophers. Conferring upon "beginnings" direct control over "consummations" is no more scientific than imagining, as teleology implies, that all events are merely movements toward carefully designed ends which control the universe.

"The view held—or implied—by some 'mechanists,' which treats an initial term as if it had an inherent generative force which it somehow emits and bestows upon its successors, is all of a piece with the view held by teleologists which implies that an end brings about its own antecedents. Both isolate an event from the history in which it finds its character."[8]

Taking Dewey's suggestion, then, we seek in biology the history in which the genes belong. For the abandonment of direct determiners does not mean that we are freed from the problems which arise in hereditary differences.

"It is not correct . . . that each particular characteristic is represented by a single gene. On the contrary to produce even so simple a characteristic as the color of the eye, many genes must interact. . . . Any feature or characteristic, structural, physiological or mental, can be changed or made defective by altering any one of the many different genes that coöperate to produce it. . . . The essential point is that in the development of any individual all the thousand of genes interact."[9]

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[7] Gates, *op. cit.*, p. 111.

[8] Dewey, J. *Experience and Nature.* (Chicago: Open Court Publishing Company, 1925), pp. 99 f.

[9] Jennings, H. S. *The Biological Basis of Human Nature.* (New York: W. W. Norton and Company, 1930), pp. 16 f.

This substitution of organic interaction among many genes for the earlier assumption of one to one correspondence between particular genes and particular characteristics suggest the widespread changes which may occur in a child's behavior due to an alteration of any one of a thousand coöperating factors.

The revision of the simple interpretation of gene action is carried a step further by the discovery that the diverse cells of the body do not differ in the genes they contain.

"As development occurs, at each cell division each chromosome divides, every gene divides, and every cell gets the entire set."[10]

In the human being this means that every one of the millions of cells has in it the twenty-four pairs of chromosomes characteristic of man, and so each cell contains the same set of probably a thousand or more different genes. Thus the difference between a nerve cell and a muscle cell does not depend upon a difference in the genes they contain, but must be sought in *other* organic conditions.

If the new genetics presented nothing more radical than the orderly interaction of multitudinous genes, hereditary determinism would still have a strong case in spite of complications. But environmental influences begin immediately (at the very moment when the ovum and spermatozoon have united) to participate with the genes in the process of differentiating the diverse parts of the body. In the early stages of development what each cell produces depends on its relation in position to other cells. Since relative position is a determining factor, if a group of cells is cut off and placed in a different position before an embryo has developed far, surprising results appear.

"Now the cells that would have produced skin produce spinal cord; those that would have produced eyes now give rise to brain, and so of all the others. . . . It can be proved by such experiments . . . that any individual cell can take part in the production of any of the structures we have mentioned, or of many others."[11]

These varied possibilities in the development of the cell do not, of course, continue indefinitely. Soon its form and function are determined by its own development in a given position, but the point is that the environmental factor of position participates in the differentiation quite as definitely as do the genes which interact with the cytoplasm of

[10] *Ibid.*, p. 86.
[11] *Ibid.*, p. 95.

the cells during development. Neither heredity (genes) nor environment (position) is the sole and infallible determiner.

The view of physical and intellectual growth which emerges when predetermination is abandoned may produce a profound difference in attitude. The teacher may come out of despondent fatalism into sanguine experimentation. Hope may arise that a change in some factor may greatly aid the backward child.

But at the present time educational psychology lags behind biology. Two illustrations from recent publications will show how difficult is the escape from over-simplification.

In an article written "to acquaint educators with the most recent and most scientific conception of 'original nature'," questionable conclusions are drawn from the discoveries regarding the function of position just cited. Note in the quotation below that the effect of position is assumed to operate by limitation or stimulation of particular genes, rather than by change in the method of interaction of all the genes.

"The genes all vary from each other and consequently they produce different substances. However, because of the influence of environment, *only certain genes* of a given cell may function so that the structure of the cell may become highly specialized. For example, a cell may be located in an environment which will stimulate *only those genes* to function which produce epithelial tissue, or may be located in an environment which will stimulate *only those genes* to function which produce osseous tissue. . . . The genes that are functioning in the first environment become dormant in the second."[12] (Note: Italics ours.)

The assumption that certain genes produce osseous tissue and certain others epithelial tissue is dangerously close to Gates statements of 1923 which we have already criticized. Dormancy as used here implies that the environment simply inhibits the action of certain genes, while it leaves others free. Compare the last quotation with Jennings' own phrasing.

"There begins at a certain spot . . . some organizing or differentiating influence, of unknown nature, which passes from cell to cell, causing each cell to alter internally (through the interaction of its genes and cytoplasm doubtless). Each cell alters in such a way as to fit it to the cells that have altered before it, so that together they constitute the organized structural pattern of the embryo."[13]

[12] Gray, J. S. "A Biological View of Original Nature," *Educational Administration and Supervision*, XVI (December, 1930), pp. 653 f.

[13] Jennings, *op. cit.*, p. 94.

Jennings' description leaves all the genes and cytoplasm free to interact under varied environmental influences until experimentation demonstrates otherwise—if it ever does.

Our second illustration concerns the modifications introduced by Gates in his 1930 revision of the text criticized by Thayer in 1928. Although Gates omits the dogmatic statement of the 1923 edition concerning "certain determiners" and "certain sense organs," and although modifying phrases are added, such as "to some extent" and "at least within limits," still traces of "predetermination" remain.

"All organs making up the human body issue from determiners in the union of male and female germ cells. . . . The structures comprising this organism are believed to be determined, at least within limits, by elements present in the fertilized egg cell. This is believed to be true chiefly for two reasons. First, in the case of simple organisms such as a certain much studied fruit fly, the elements, or rather certain groupings of them, can be observed under the microscope and their tendency to issue into certain bodily traits has been verified by observation. Second, in the case of human beings, the resemblances of offspring to each other and of offspring to parents are such as to suggest strongly that many human traits are to some extent predetermined in a similar way by elements in the human germ cell."[24]

Now if organs "issue from" hereditary elements, it is quite as true that they "issue from" relative position and cytoplasm. Not one of these factors is solely responsible, so none of them have any special right to the name "determiner." And what is the meaning of "at least within limits" or "to some extent" when connected with "predetermined"? If determination has occurred that is settled, and if not, then it is misleading to use this word however modified. Research indicates that determination of structural differences may be long delayed, and that predetermination of behavior is impossible with a growing, learning organism in a changing environment.

The denial of predetermination involving as it does emphasis upon environmental factors might lead some readers to identify the "organic" view with the environmental bias of behaviorists like John B. Watson. We must note that differences in his sets of genes do result in differences in an individual *as a whole*.

"Observation and experiment have shown that . . . different individuals start with diverse sets of these substances (genes). . . . No two individuals, in such organisms as man, are concocted on the same recipe

[24] Gates, A. I. *Psychology for Students of Education.* (Revised Edition), (New York: The Macmillan Company, 1930), pp. 71 f.

(save in the rare cases known as identical twins). It is clearly proved experimentally that the diverse combinations yield structural and physiological differences of all types and grades, including diversities of behavior, in what we call mentality."[15]

"The action of a particular gene is not limited to a particular part or constituent of the body. Many single genes produce far-reaching effects, influencing the entire constitution and functioning of the individual. . . . Morgan has expressed the opinion that every gene affects the entire organism."[16]

This evidence leaves no room for intimations that teachers may safely ignore heredity. An educational error arises out of depending too much upon the wide range of adjustability characteristic of normal and brilliant human learners. As Jennings says, Watson's assertion that he *can* train "normal" or "healthy" infants "to become any type of specialist" does not assure us that this is the most appropriate treatment for individuals who actually do differ from each other.[17] Overemphasis upon the effectiveness of environmental stimuli is almost as misleading as deterministic assumptions of hereditarians. In both theories the design is laid out in advance without respect for genuine growth of individuality.

Endocrinology has thrown light into many obscure corners where hereditary determiners were hitherto assumed to rule. The fact that the action of the genes is *mediated* through hormones is of tremendous import. Because when chemicals corresponding to certain hormones are introduced in a defective organism, these chemicals perform more or less adequately the functions of genes which might have been inherited, but were not. So through the feeding of thyroid to an idiotic dwarf—a cretin—he "becomes a normal child, with normal intelligence."[18]

The possibilities which are forecast by recent progress in endocrinology suggest that in the training of prospective teachers consideration of remedial measures may more and more supersede an earlier overemphasis upon permanent classification.

But those who regard heredity as a more or less rigid core which stabilizes development contend that special diets and surgical operations constitute artificial factors. They say that under "natural" conditions the "native" characteristics appear. This attempt to evade environmental influence is as unscientific as Watson's use of the term "normal"

[15] Jennings, H. S., *op. cit.*, pp. 1 f.
[16] *Ibid.*, p. 107.
[17] *Ibid.*, pp. 179 f.
[18] *Ibid.*, p. 118.

to exclude those learners who are not sufficiently responsive to modification by environmental change. On this point Jennings says, "The production of some of the hormones is under the influence of the nervous system, and through it is profoundly affected by outer (natural) conditions." His description of the tremendous alterations in the salamander concludes, "Clearly this animal may have either of two extremely diverse sets of characteristics, depending upon the (natural) conditions that it meets."[19] The biologist warns the educator that general, dogmatic statements which credit differences in physique, temperament or intelligence to "native" equipment under "natural" conditions are not scientific.[20]

Two other misleading forms of statement dog the footsteps of educators as they move toward an organic view. The first identifies all influences operating "from within" the body as "hereditary," while the second simply speaks of growth as an "interaction of nature and nurture." We illustrate from the Gates 1930 edition.

"The fact that growth in height after birth tends to go on in such a continuous manner, describing a curve of rather consistent character, suggests that its *rate* is determined from within rather than from without.

"Growth itself is necessarily dependent upon environmental factors. It goes on only when one has proper food, sleep, exercise and surroundings. Growth, literally, can be due neither to heredity or environment alone. . . . It is the resultant of the interaction of nature and nurture. . . . Yet as far as we now know, marked variations in the general trend of growth of the skeleton are produced only by rather extreme and extraordinary variations from normal or typical conditions. A person's height then is in general largely an expression of an innate predisposition. . . . The growth of a child's height, provided he leads a reasonably normal life, can be little influenced by environmental factors."[21]

Biological research finds that multitudinous factors coöperate "within" the body to determine its rate of growth. While gene influences are very important, they do not constitute the whole history of development. Unless we have specific evidence that differences in genes produce certain alterations of growth curves, it is wiser to credit these changes to the prenatal and postnatal *history* of the individual, which then calls for investigation. The scientific attitude emphasizes a consideration of many factors as opposed to narrowing assumptions of one cause.

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[19] *Ibid.*, p. 125.
[20] *Ibid.*, pp. 134-137.
[21] Gates, *op. cit.*, pp. 87-90.

Nor can a teacher attain a clarified view of growing, achieving individuality by merely accepting a doctrine of interaction between nature and nurture. This apparently impartial statement may be just a verbal balancing that may prevent one from grasping an organic view. Interactionism of this sort is likely to assume a separation by which heredity has the upper hand for a while and then environment may supervene. The teacher is more startled than helped by a radical statement that in a particular case, "Inheritance is determined by environment."[22] Progress toward clarification will come through frankly facing the fact that when changes occur—whether classified as growth, as learning or as unique achievement—the transformation of the whole individual is so permeating and the outcome so integrated that attempts to isolate *an* assumed controlling factor must be guarded with extreme caution. "Interaction" is a deceptive word.

But this discussion should turn more definitely toward the constructive educational implications of the new genetics. The shift of biology away from simple hereditary mechanisms leaves the psychologist free to seek an organic view of the learning process. If growth is not predetermined then surely learning cannot be. However, the biologist has only let down the bars: he has not made clear just how achievements occur or ideas come. On the positive side, biology suggests that individuals be regarded as integrated wholes from the beginning of life, and that many factors be considered as members freely coöperating in the consummation of an appropriate action at the moment when it occurs. Although educators are deeply indebted to biologists, still psychologists must build upon an organic view of growth their own theories of learning.

Education must not only escape from machine-like practices and theories, but it must achieve a scientific view which will avoid the magic that envelops "progressive" education. While "creative" teachers are frankly experimentalists they seem to fear psychological theory. They bewilder the student of education with talk about "mysterious recesses of personality" out of which come artistic products due to "inner necessity."[23] If "progressives" in education are to make good their claim of leadership they must at least join in the search for a more adequate theory.

Before considering the present status of organic theory in education we may note briefly that physiology has made a complementary contribu-

[22] Gray, *op. cit.*, p. 653.

[23] Mearns, Hughes. *Creative Power.* (Garden City: Doubleday, Doran and Company, 1929), p. 256.

tion by presenting experimental evidence against narrow conceptions of neural bond formation. Lashley's words sound like a second challenge to the psychology of S-R bonds.

"The learning process and the retention of habits are not dependent upon any finely organized structural changes within the cerebral cortex. The results are incompatible with theories of learning by changes in synaptic structure, or with any theories which assume that particular neural integrations are dependent upon definite anatomical paths specialized for them. Integration cannot be expressed in terms of connections between specific neurones."[24]

Thus the physiologist as well as the geneticist supports the criticisms leveled against the "strengthening" and "shifting" of preformed bonds by representatives of two "organic" viewpoints,—the *purposive* and the *gestalt* theories of learning. Although space forbids an extensive discussion of "organic" views, we may briefly note the congruity of these two conceptions with recent research.

Emphasis upon "purposive behavior" may be traced back more than thirty years to Dewey's criticism of the mechanical separation of stimulus or environment from response or learner contained in the "reflex-arc concept."[25] Later Dewey stressed the "purpose" of the learner as the key to any intelligent, adjustive action which is appropriate to the organism in the environment of the moment.[26]

In the first place, the "purpose" with which an act of learning begins represents the whole of that action. While the purpose includes in its scope all pertinent factors within and without the learner, it is also the integrative center of action. The "purposive" theory need not assume ready-made parts which are merely to be fitted together later. The "whole-hearted-purpose" stands for the whole individual striving to organize or create appropriate behavior.

Secondly, a "purpose" involves a more or less difficult problem. The learner finds himself in a novel situation. He is uncertain and the environmental situation seems vague. Nevertheless the acts, and *as* he acts the situation may clear up. At first his purpose is vague and its guidance may be general rather than specific. But *as* action proceeds the learner becomes more exact in his responses. The point is that his pur-

[24] Lashley, K. S. *Brain Mechanisms and Intelligence.* (Chicago: University of Chicago Press, 1929), p. 176.

[25] Bode, B. H. *Conflicting Psychologies of Learning.* (Boston: D. C. Heath and Company, 1929), pp. 235 ff.

[26] Dewey, J. *Democracy and Education.* (New York: The Macmillan Company, 1915), pp. 34, 120.

pose changes from a generalized desire for some end to a clear determination of means and to possible revision of the end *as* he attains it. The stimulating situation changes *as* he enters into it. In the words of Bode, "This *progressive* making over of the stimulus (is) the everlasting difference between purposive and mechanical behavior."[27] According to this interpretation neither stimulus nor response can be "preformed." The experienced object and the reaction vary concomitantly. Purposive behavior traces a history broad in scope and progressive in action.

Dewey's criticisms of hereditary predetermination clearly indicate that a liberal, organic biology is an essential feature of the purposive behavior concept. He denies that there are "definite, independent, original instincts which manifest themselves in specific acts in a one-to-one correspondence."[28] Thus, "purposive behavior" can gladly grasp the recent findings of biology and physiology because all three are complementary approaches toward an organic view.

Gestalt psychology also has no fears of new trends in biology which undermine simple, mechanistic hypotheses. Koffka takes particular pains to deny that even a reflex can consist of a predetermined, inherited connection.[29] Ogden chooses as his definition of instinct Lloyd Morgan's phrase—"persistency with varied effort."[30] All behavior from reflex to "insight" seeks and finds ends in accordance with its own structure. The dynamic pattern which is achieved in the behavior is a new whole, not a mere assemblage of parts. Out of a vague background a clear perceptive pattern may emerge or a suitable action occur. Freedom and ability of the individual to perform novel acts is recognized. Thus, *gestalt* theory, which emerged twenty years ago from research in perception, also offers a key to the understanding of genuine achievement. Its leaders openly deny the type of mechanistic theory which assumes that wholes are constructed by connecting together preformed parts without fundamental alteration of those parts.

Mechanists commonly proclaim that the adherents of "purposive learning" and of *gestalt* theory hold teleological notions. This criticism would be valid if "purposes" and "configurations" were regarded as

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[27] Bode, *op. cit.*, p. 247.

[28] Dewey, J. *Human Nature and Conduct.* (New York: Henry Holt and Company, 1921), p. 149.

[29] Koffka, K. *The Growth of Mind.* New York: Harcourt Brace and Company, 1925), pp. 69 ff.

[30] Ogden, R. M. *Psychology and Education.* (New York: Harcourt Brace and Company, 1926), p. 18.

fixed in advance. But in both cases we have seeking and finding in the midst of behavior. These concepts of dynamic, progressive, sudden changes of "wholes" avoid the fundamental error of accounting for a process solely by the structure of its beginning or its final end. The way is left open for acts which are genuinely creative without implying that something beautiful and wonderful arises out of mysterious recesses of personality due to mere inner necessity.

Whether *purpose* or *gestalt* or some other view offers the most adequate guide is a question demanding openmindedness. At present some mechanists seem inhibited by fear that the study of *gestalt* or *purpose* exposes the student to capture by a spook. While there may be a bit of mystery left in organic behavior, surely the findings of biology and physiology challenge teacher-trainers to lead prospective teachers into understanding and application of an organic view of the processes by which creative individuality may be achieved.

DIFFERENTIAL PREDICTION OF ABILITY AS REPRESENTED BY COLLEGE SUBJECT GROUPS

(Continued from January)

DAVID SEGEL
Specialist in Educational Tests and Measurements Office of Education

THE PRACTICAL APPLICATION OF THE DIFFERENTIAL PREDICTION EQUATIONS

We shall illustrate in this section the application of the four prediction equations obtained in the preceding section.

In order to lessen confusion in the arithmetical computation and for ease of interpretation the differences in marks between any two subject groups have been transformed so that the final predictive value is positive. This transformation scale is given in Table VIII. In the calculations of this study these transformed values have been used.

For illustrative purposes we have applied our equations to the original records used in this study. For this purpose we chose to take a sample of the students who had complete test and questionnaire data and at least one actual difference between subject groups out of the four differences we are predicting. Fifty-six of our students came under this classification. The use of the original records for this purpose causes a somewhat better prediction, no doubt, than would be the case if we had new records to use.

The equation for economics and history in favor of history is

$$\overline{X}_d = -.474\ X_1 + .192\ X_2 - .138\ X_3 + .015\ X_4 + 24.5$$

TABLE VIII

TABLE FOR CHANGING DIFFERENCES IN MARKS BETWEEN COLLEGE SUBJECT GROUPS TO A POSITIVE VALUE

Difference	Transformed Score	Difference	Transformed Score
—1.3	1	.5	19
—1.2	2	.6	20
—1.1	3	.7	21
—1.0	4	.8	22
— .9	5	.9	23
— .8	6	1.0	24
— .7	7	1.1	25
— .6	8	1.2	26
— .5	9	1.3	27
— .4	10	1.4	28
— .3	11	1.5	29
— .2	12	1.6	30
— .1	13	1.7	31
.0	14	1.8	32
.1	15	1.9	33
.2	16	2.0	34
.3	17	etc.	
.4	18		

Substituting the values from the tests for the first student, V. A., in the equation gives us the following:

$$-.474\ (71) + .192\ (107) - .138\ (5) + .015\ (160) + 24.5 = \overline{X}_d$$

$$\text{or } -33.7 + 20.5 - .7 + 2.4 + 24.5 = \overline{X}_d = 13.0$$

Similarly, the values for the other students have been calculated for this equation and for the other three prediction equations. Table IX gives the values in the four prediction equations after substitution of the test scores for the first four cases of the fifty-six cases selected as above mentioned. The predicted score, i.e., a predicted difference is given in the last column of the table.

Since these predicted differences are regressed values they cannot be compared directly with the differences actually found. However, rank placement comparisons may be made. We made such a comparison for all fifty-six cases mentioned. We counted the number of times the predicted and actual differences were above or below the mean and the number of times the predicted and actual scores were on opposite sides of the mean. By chance alone the number of cases in each category would be 50 percent. We found that about 70 percent of the cases for these four equations were correctly classified. This is in accordance with the relationship indicated by the multiple correlation coefficients given in Part IV.

TABLE IX

TABLE SHOWING CALCULATIONS FOR THE FIRST FOUR CASES ON THE FOUR PREDICTION EQUATIONS

Economics and History

Student	$-.474X_1$	$+.192X_2$	$-.138X_3$	$+.015X_4$	$+24.5$	$=\overline{X}_d$
V. A.	− 33.7	+ 20.5	− .7	+ 2.4	+ 24.5	= 13.0
E. Bri.	− 43.6	+ 26.9	− 1.1	+ 3.2	+ 24.5	= 9.9
T. B.	− 38.9	+ 31.9	− 1.0	+ 4.3	+ 24.5	= 20.8
E. C.	− 43.1	+ 32.3	− 2.6	+ 2.6	+ 24.5	= 13.7

Languages and Economics

Student	$.391X_1$	$-.371X_2$	$+.010X_3$	$+.012X_4$	$+.018X_5$	$+.044X_6$	$+26.4$	$=\overline{X}_d$
V. A.	27.8	− 39.7	+ 0	+ 1.9	+ 5.8	+ 5.3	+ 26.4	= 27.5
E. Bri.	36.0	− 51.9	+ .1	+ 2.5	+ 6.1	+ 1.4	+ 26.4	= 20.6
T. B.	32.1	− 61.6	+ .1	+ 1.1	+ .5	+ 4.1	+ 26.4	= 2.7
E. C.	35.6	− 62.3	+ .2	+ 2.1	+ 6.1	+ 4.2	+ 26.4	= 12.3

Languages and Physical Science

Student	$-.161X_2$	$+.037X_3$	$-.008X_4$	$+.001X_5$	$+.029X_6$	$+36.3$	$=\overline{X}_d$
V. A.	− 17.2	+ .2	− 1.3	+ .3	+ 3.5	+ 36.3	= 21.8
E. Bri.	− 22.5	+ .3	− 1.7	+ .3	+ .9	+ 36.3	= 13.6
T. B.	− 26.7	+ .3	− .7	+ 0	+ 2.7	+ 36.3	= 11.9
E. C.	− 27.0	+ .7	− 1.4	+ .3	+ 2.8	+ 36.3	= 11.7

History and Physical Science

Student	$.187X_1$	$+.087X_2$	$-.031X_4$	$-.029X_5$	$-.003X_6$	$-.2$	$=\overline{X}_d$
V. A.	13.3	+ 9.3	− 5.0	− 9.4	− .4	− .2	= 7.6
E. Bri.	17.2	+ 12.2	− 6.5	− 9.8	− .1	− .2	= 12.8
T. B.	15.3	+ 14.4	− 2.7	− .8	− .3	− .2	= 25.7
E. C.	17.0	+ 14.6	− 5.5	− 9.9	− .3	− .2	= 15.7

We have illustrated graphically our method of success prediction for the first girl and the first boy of our fifty-six cases.

The accuracy of the prediction made by the differential prediction method can be determined in an individual case by comparing the predicted difference with its probable error. For many cases our method is as yet inaccurate. As better measures are used, however, this method of differential prediction will become more and more useful. With the prediction items used in this study many of the predictions are quite accurate. Where there is room for doubt other corroborative evidence in the form of scholastic success, expressed interests, etc., can be used to give some accuracy to the guidance of a student.

The probable error given herein is an average value and is applicable to each one of the differences of the total population under consideration or to any single random sampling of such population. It is to be noted that if we deliberately choose differences from a population because of

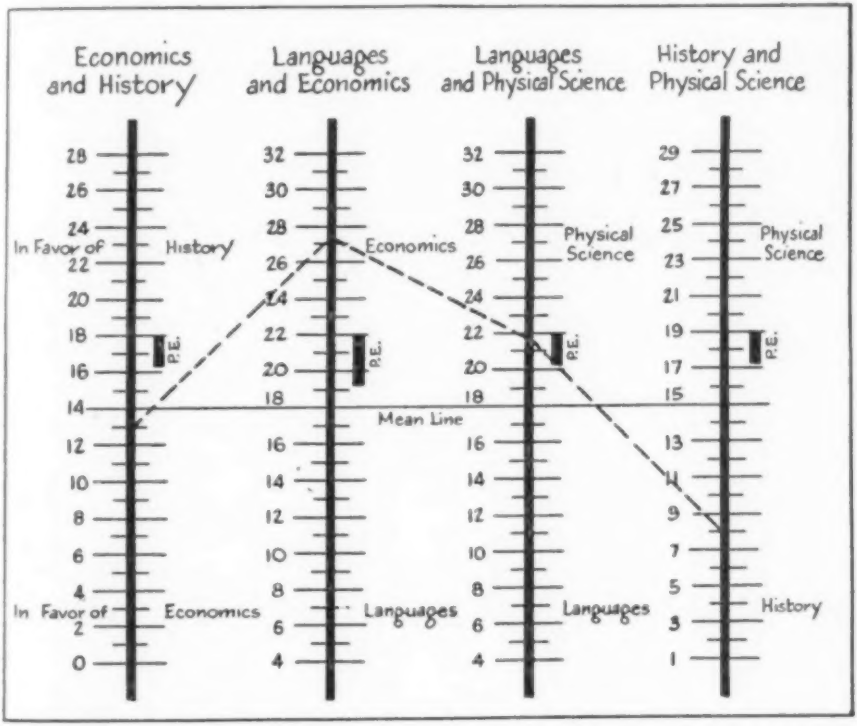

FIGURE 1. DIFFERENTIAL PREDICTION OF COLLEGE SUCCESS FOR V. A.

some particular quality such as the picking out of especially large differences in one direction the probable error is too small or too large.[19]

The differential prediction for V. A., the first girl on the list, is shown in Figure 1. This shows no reliable differentiation as between economics and history since the predicted score of 13 is only one point below the mean and the probable error is 1.7. The differentiation in favor of economics as opposed to Languages is fairly significant because the predicted score is 9.5 above the mean of 27.5 which is 3.3 times the P. E. There is a differentiation in favor of physical science over languages of 3.8 which is about 2 ½ times the P. E. of 1.48. This differentiation can be considered as indicating a possibility of being better in

[19] For further discussion of this point see Kelley, T. L. *Interpretation of Educational Measurements.* (Yonkers, New York: World Book Company, 1927), pages 184 and 185.

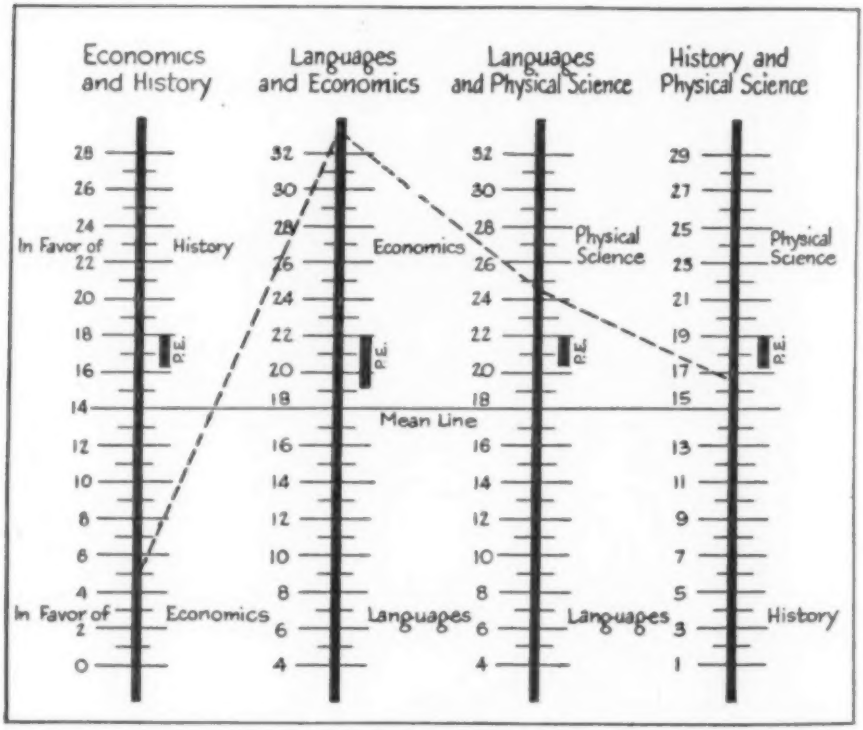

FIGURE 2. DIFFERENTIAL PREDICTION OF COLLEGE SUCCESS FOR E. B$_0$.

physical science than in languages. The differentiation of history and physical sicence in favor of history is quite marked since the predicted score is 7.4 below the mean which is over 4 times the P. E. of 1.79. From a study of the pattern of prediction presented, one can go further and indicate the probable arrangement of the four subjects as to success in them in a descending order as follows: economics, history, physical science, and languages.

The first boy, E.Bo., (see Figure 2) exhibits a marked superiority of economics over languages and history according to the first two differentiations. The predicted score in favor of economics for each of the two differentiations is considerable over 4 times the P. E. The differentiation of languages and physical science shows that the chances of success are in favor of physical science. The chances of success in these subjects for this boy would be in a descending order as follows: economics, physical science, history, and languages.

An examination of these patterns shows that not only can a differential prediction between a pair of subjects be made but also that the chances of success in several subject groups may be estimated so that they can be placed in order as to comparative chances of success in them.

SUMMARY AND CONCLUSIONS

We have developed a method of prediction which we call differential prediction. We have illustrated the use of the method on the college level. There is nothing which stands in the way of using the method at any scholastic level or with abilities other than scholastic. The value of the method lies in the fact that it furnishes a direct comparison of predicted success as between two possibilities. With this method one can say, statistically, just what the chances are of doing better in one task than in another, assuming suitable prediction items.

The critical point of this study was, undoubtedly, the adaptation of the multiple regression equation to find a difference between two scores and the adaptation of the formula for the standard error for this new formula.

The multiple regression formula adapted to find predicted differences is as follows:

$$\overline{X}_d = b_{d1.23.....n}\ X_1 + b_{d2.13.....n}\ X_2 ..... + b_{dn.12.....(n-1)}\ X_n + C$$

(Formula Number 1)

The error of estimate of Formula Number 1 is as follows:

$$\sigma^2_{d.1} = b^2_{d1.23.....n}\ \sigma^2_1(1 - r_{1I}) + b^2_{d2.13.....n}$$
$$\sigma^2_2\ (1 - n_{2II}) \quad ..... \quad + b_{dn.12.....(n-1)}$$
$$\sigma^2_n\ (1 - n_{nN})$$

(Formula Number 2)

We have illustrated the use of these formulae on the college level of scholastic ability. To do this we found it economical to establish the fact that there were differential abilities existent on the college level. To do this we established the relationship between various college subject groups by the use of the intercorrelation of marks made in the college subject groups selected, and corrected them for attenuation. That many college subject groups are differentiable is an interesting and important value resulting in the development of this study.

We then proceeded to work out the multiple regression equations according to Formula Number 1, and the errors of estimate according to Formula Number 2 for certain of these subject group pairs, using as predicting data the results on certain tests and questionnaires given to these same students the college records of which had been assembled. We found four college subject group pairs that had a multiple correlation coefficient of over .50 between prediction items and the criterion. The multiple regression equations and the errors of estimate were calculated for these four pairs of subject groups. The multiple coefficients of correlation obtained were of various values, the total range on the ten pair of college subject groups used was from .333 to .694. The coefficients indicate that we have been as successful in differential prediction as others have been in the direct prediction of success. Since a first use of a new method is not apt to produce its best use, it seems possible, indeed, that differential prediction may result in producing more accurate prediction. Further, the method fills a decided need in educational guidance.

A SIMPLIFIED COMPUTATION OF NON-LINEAR CORRELATION

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UNTIL recently the writer had found the computation of the Correlation Ratios (η_{yx} and η_{xy}) extremely laborious. Inasmuch as numerous situations in educational and psychological research definitely demand that the relationship or concomitancy of the measurements of traits be treated as non-linear or curvilinear, a simple and easy technique of computation of η's seemed desirable. The writer has developed a technique of computation which satisfies the demands for ease, simplicity, and accuracy, and which effects a great saving of time.

The practice usually followed in dealing with a correlation problem is:

1. To construct the conventional correlation table or scattergraph.
2. To compute the Pearson r since the rectilinear regression possesses advantages not found in the non-linear regression and since the Pearson r would be necessary to establish the linearity or non-linearity of the regression.
3. To compute one correlation ratio, e.g., η_{yx}
4. To test the linearity of the regression by computing zeta (ζ) and sigma zeta ($\sigma\zeta$) and to find the ratio of ζ to $\sigma\zeta$
5. To complete the problem either as a linear or as a non-linear regression as determined by the tests of linearity.

η_{yx} is computed from the formula

$$\eta_{yx} = \frac{\sigma_{mx}}{\sigma_x}$$

in which σ_{mx} is the standard error of the X means in the Y arrays, and σ_x is the standard error of the distribution. Computation of σ_{mx} involves:

1. The computation of the X means (X') in the separate Y arrays,—*a time consuming process.*
2. The computation of the deviations of the X means from true average X ($X' - X$). This ordinarily, computed in the units of measurement, gives results in decimals.
3. The squaring of the deviations found in (2), $(X' - X)^2$,—*another time-consuming operation.*
4. Weighting the squared deviations for the frequencies involved in the different arrays, $f(X' - X)^2$.
5. Computing σ_{mx} from the formula

$$\sigma_{mx} = \sqrt{\frac{\Sigma(f(X' - X)^2)}{N}} \qquad (2)$$

Obviously if the computation of σ_{mx} could be kept in score intervals the work would be somewhat simplified. Furthermore, if σ_{mx} could be computed by utilizing deviations from a "Guessed Average," "Assumed Average," or "Point of Arbitrary Origin" to which a correction could be applied, still more work could be avoided. In computing r from a scattergraph or correlation table the writer utilizes the commonly computed column of Σx figures which are multiplied by y to secure $\Sigma x'y'$. This Σx column of figures already computed efficiently links the computation of η to the computation of r.

Ordinarily in computing σ_{mx} the means in the arrays (X′) are computed to enable the computation of the deviations of these means from the true average $(X' - X)$. $(X' - X)^2$ and $f(X' - X)^2$ are computed as intermediate steps to the computation of $\Sigma(f(X' - X)^2)$. The Σx figures, however, computed to secure r are *the algebraic sums of the X′ moments in each Y array, computed from the "Assumed Average." Each* Σx *divided by its corresponding* $f\frac{(\Sigma x)}{f}$ *is the deviation of each mean in its array from the "Assumed Average."* Each $\frac{\Sigma x}{f}$ squared $\left(\frac{\Sigma x}{f}\right)^2$ would be the squared deviation from the "Assumed Average" of each mean in its array. To weight these squares for the frequencies in each array, the squares should be multiplied by their corresponding f's. But

$$f\left(\frac{\Sigma x}{f}\right)^2 = \frac{(\Sigma x)^2}{f}$$

Starting with Σx to secure $\frac{(\Sigma x)^2}{f}$ it would be necessary simply to square each (Σx), which could be done from a table of squares, and then to divide each $(\Sigma x)^2$ by its corresponding f. To do so, however, would not give the $\frac{\Sigma x}{f}$ values in the arrays, which values would very likely be used to plot the curvilinear lines of regression. Since there would be required two columns of figures, $(\Sigma x)^2$ and $\frac{(\Sigma x)^2}{f}$, with a third column $\frac{\Sigma x}{f}$ for plotting the line of regression, a more economical method is to compute $\frac{\Sigma x}{f}$ by dividing Σx by f and to compute $\frac{(\Sigma x)^2}{f}$ by multiplying $\frac{\Sigma x}{f}$ by Σx.

$\Sigma \frac{(\Sigma x)^2}{f}$ is the sum of the squares of the deviations (in Score Intervals) of the means in the arrays from the "Assumed Average." To compute σ_{mx} from the true average a correction already computed (c_x^2) has to be applied and

$$\sigma_{mx} = \sqrt{\frac{\Sigma \frac{(\Sigma x)^2}{f}}{N} - c_x^2} \quad . \text{ Score Interval} \tag{3}$$

Since $\Sigma \frac{(\Sigma x)^2}{f}$ in the formula is a singular number, the formula may be simplified in appearance by letting

$$A = \frac{(\Sigma x)^2}{f} \tag{4}$$

$$\text{and } B = \frac{(\Sigma y)^2}{f} \tag{5}$$

$$\text{Then } \sigma_{mx} = \sqrt{\frac{\Sigma A}{N} - c_x^2} \quad . \text{ Score Interval} \tag{6}$$

$$\text{and } \sigma_{my} = \sqrt{\frac{\Sigma B}{N} - c_y^2} \quad . \text{ Score Interval} \tag{7}$$

$$\eta_{yx} = \frac{\sigma_{mx}}{\sigma_x} = \frac{\sqrt{\frac{\Sigma A}{N} - c_x^2} \quad . \text{ Score Interval}}{\sqrt{\frac{\Sigma x^2}{N} - c_x^2} \quad . \text{ Score Interval}} \tag{8}$$

Since "Score Interval" is involved in both σ_{mx} and σ_x, and since r may be computed more efficiently by utilizing computations in "Score Intervals," the notation may be changed so that

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{N} - c_x^2} \quad . \text{ Score Interval, and} \tag{9}$$

$$\sigma'_x = \sqrt{\frac{\Sigma x^2}{N} - c_x^2} \quad , \text{ and} \tag{10}$$

$$\sigma'_{mx} = \frac{\sigma_{mx}}{\text{Score Interval}}, \text{ then} \tag{11}$$

$$\eta_{yx} = \frac{\sigma'_{mx}}{\sigma'_x} = \frac{\sqrt{\frac{\Sigma A}{N} - c_x^2}}{\sigma'_x} \quad \text{and} \tag{12}$$

$$\eta_{xy} = \frac{\sigma'_{my}}{\sigma'_y} = \frac{\sqrt{\frac{\Sigma B}{N} - c_y^2}}{\sigma'_y}. \tag{13}$$

Since σ'_x and σ'_y are necessary to compute r and since after r has been computed the actual determination of η_{yx} involves the computation of ΣA or $\Sigma \frac{(\Sigma x)^2}{f}$ from two instead of the usually required four columns of figures [mean X measures in the arrays (X′), deviation of X′ from X mean $(X' - X)$, square of deviations $(X' - X)^2$ and weighted squares of deviations $f(X' - X)^2$], and the use in the formula of three other elements, N, c_x^2 and σ'_x previously computed, it is clear that considerable economy of time has been effected. The determination of η_{xy} involves the computation of ΣB or $\Sigma \frac{(\Sigma y)^2}{f}$ from three instead of four columns of figures, since ordinarily Σy will not have been computed to secure r, and the use of three other elements, N, c_y^2, and σ'_y already computed. Considering the nature of the arithmetic computations, the reduced possibility of computational errors, the saving of time, and *the simplicity of the nomenclature* involved, it is believed that this method of dealing with correlation ratios will be appreciated.

A method of computing and plotting non-linear correlations presented by Dr. Karl J. Holzinger[1] utilizes several steps outlined herein. Dr. Holzinger's method requires two additional columns of figures. The figures are of larger magnitudes requiring consequently more labor, and the plotting of the curvilinear lines of regression requires first the computation of as many arithmetic averages as there are columns and horizontal arrays in the scattergraph. In the problem which follows there would need to be computed thirty-six separate averages for the plotting of the lines of regression. In the method herein presented the computation of the two arrays of averages are unnecessary.

When η_{xy} and η_{yx} have been computed it usually is desirable to plot the curvilinear lines of regression. $\frac{\Sigma x}{f}$ and $\frac{\Sigma y}{f}$ previously computed enable the plotting of both lines *without further computation*. Each $\frac{\Sigma x}{f}$ and $\frac{\Sigma y}{f}$ value is the deviation of each mean X and Y value in its respective array computed in score intervals from the "guessed" or "assumed" average. Each mean point in its array *can* be located numerically by adding algebraically to the "guessed average" value the

[1] Holzinger, Karl J. *Statistical Methods for Students in Education* (Boston: Ginn and Co., 1928), page 182a.

CORRELATION BETWEEN
Regression Equations
Test of Linearity
Trait "X"
Trait "Y"

$\frac{\Sigma x}{f}$ or $\frac{\Sigma y}{f}$ value multiplied by their respective score intervals. Graphically these points can be located to the nearest tenth-score-interval value by locating points $\frac{\Sigma x}{f}$ or $\frac{\Sigma y}{f}$ score intervals from the mid point of the "assumed average" interval. These mean points are correctly located with respect to the true averages since the effect of the correction for the assumed X and Y averages (c_x and c_y), which would be added to the "assumed averages" and subtracted from $\frac{\Sigma x}{f}$ and $\frac{\Sigma y}{f}$ respectively, would be neutralized.

A Correlation Chart[2] or sheet has been designed to incorporate the advantages of the above simplified computation of non-linear correlations in readily workable form. A complete exposition of the method of computation accompanies the Form. The Form with a sample problem is shown on page 103.

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[2] Dvorak, August, and Jensen, Myra. *Linear and Non-Linear Correlation Chart.* New York: Longmans, Green and Co., 1931.

THE COMPARATIVE QUALITY OF WORK DONE BY STUDENTS IN RESIDENCE AND IN CORRESPONDENCE WORK

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INTRODUCTION

CORRESPONDENCE study work is an important element in the education of to-day. On both the secondary and the collegiate levels we have correspondence courses enrolling thousands of students. In a recent (unpublished) study of 74 schools which grant the master's degree in the field of education, five schools were listed as granting graduate credit for correspondence study, the amount of such credit ranging from two to ten semester hours.

There is a diversity of viewpoints among educators concerning the comparative quality of work done by students in courses in residence and in correspondence study. Objective evidence must be substituted for mere opinion on this issue. One type of evidence that has been used in discussions of the comparative quality of work in correspondence and residence courses is teachers' marks. Even on this question there has been considerable difference of opinion. To determine whether or not there are differences in the marks received by students in correspondence and residence courses, the present study was made.

THE DATA AND THEIR TREATMENT

The data used in this study are the marks of 56 students who had done residence work at the University of Arizona and who had also earned six or more units (semester hours) of credit by correspondence study in the same institution.[1] The grades in residence study were assigned by the usual instructors in the University courses; the correspondence study grades were assigned by the "readers" of correspondence courses. In many cases these readers are the instructors of the corresponding courses in residence; in some the readers are graduate students or specially assigned instructors doing this work with the approval and under the direction of the department concerned. The average number of units of residence credit for the students represented in this study is 26; the average number of units of correspondence study credit is 10. Passing

[1] More extended data and investigations of various phases of correspondence and extension study are to be found in the forthcoming yearbook of the American Association for Adult Education.

grades at Arizona are represented by the numerals 1, 2, 3, 4. A failing grade is represented by 5.

Several methods of treatment of the data were employed. The first plan was to compare the average grade of the students in residence work and in correspondence courses. The arithmetic mean of the grades earned in residence is 2.33 ± 0.043; the mean of the grades earned by correspondence is 1.95 ± 0.032. The standard deviation of the distribution of grades earned in residence is 0.476; of correspondence grades 0.35. The difference of the means is 0.38. The formula (1) σ difference $= \sqrt{\sigma(\text{av}_1)^2 + \sigma(\text{av}_2)^2}$ was used to determine the standard deviation of the difference of the means. The result thus secured is 0.08. Dividing the difference of the means (0.38) by the standard deviation of this difference (0.08) we secure 4.75 as a result. Since a quotient as large as 3 indicates practical certainty of the significance of the difference and of its recurrence in the same direction in similarly selected material the conclusion may properly be drawn that there is a real difference between grades earned in residence and those earned in correspondence study. Grades earned in correspondence courses tend to be slightly higher than those earned by the same students in courses in residence.

For fear that the means of either type of grades might be influenced by the presence of a large number of units of either high or low marks, a comparison was made of some of the percentiles of each distribution of grades. The residence grades of the 56 students were arranged in order from highest to lowest; the same procedure was followed with correspondence grades. The number of hours of credit of each student was not taken into account. With this method of computation the results are as follows:

	Grades earned in residence	Grades earned by correspondence
90 percentile	1.38	1.27
75 percentile (Q3)	1.75	1.44
50 percentile (median)	2.23	2.00
25 percentile (Q1)	2.85	2.18
10 percentile	3.27	2.67
Range	1.05–3.70	1.00–3.00 (One case [4.10] above 3.00)

This plan of comparison also seems to indicate that these students had slightly higher grades in correspondence courses than in work done in residence.

Another method of comparison was employed. The grades of students in correspondence work were compared with the grades of the same students in residence as indicated in the accompanying table.

TABLE I

THE GRADES OF STUDENTS IN CORRESPONDENCE STUDY COURSES AND OF THE SAME STUDENTS IN RESIDENCE COURSES

Grades of Correspondence Students Compared with Their Grades in Residence	Number of Students	Percent of Total
2.00 or more points higher	1	1.8
1.50 – 1.99 points higher	1	1.8
1.00 – 1.49 points higher	9	16.0
0.50 – 0.99 points higher	13	23.0
0.00 – 0.49 points higher	16	29.0
No difference	1	1.8
0.00 – 0.49 points lower	11	20.0
0.50 – 0.99 points lower	4	7.0

Read Table I thus: "One student had an average grade in correspondence study 2.00 or more points higher than in residence courses, one had a grade 1.50 – 1.99 points higher, nine had grades 1.00 – 1.49 points higher, etc."

It will be noted that with 80 percent of the students there is a difference of less than one point on a four point scale of grading. With 50.8 percent there is less than a half point of difference in average grades assigned to credit earned by the two types of work. However, 72 percent of the students received higher grades in correspondence courses as compared with 27 percent whose grades were lower. The grades in correspondence study are somewhat higher than those earned in residence.

The two cases in which the correspondence study grades are 1.5 or more points higher than residence grades deserve some explanation. The relatively high correspondence study grades were earned in courses in Spanish by two bilingual students of Spanish-speaking parentage. These same students did work of average quality in their courses in residence.

The correlation between the two sets of grades was computed, using the Pearson product-moment method. Half-point intervals were employed. The correlation thus secured is $.575 \pm .06$. This correlation is not high enough to predict accurately the grades in correspondence study from those in residence courses or vice versa. The results secured by the other methods of comparison would imply that a capable student in residence work would probably secure as high, or higher, grades in correspondence courses.

INTERPRETATION OF RESULTS

The outstanding conclusion in this comparative study is that the grades earned in correspondence courses are consistently higher than those earned in residence. There are several possible explanations for this condition.

1. There is a difference in the number of units of work represented. With an average of 26 units in residence and 10 in correspondence the chances of securing some low as well as some high marks are increased. The original data show a greater spread of marks, in residence courses, both as indicated by the comparisons of the standard deviations and of the total range.
2. Correspondence study may indicate a more favorable choice of courses on the basis of interest and individual aptitude. Some difficult courses which are required of all students may be taken only in residence. A student enrolling for correspondence work will probably take only courses in which he has a vital interest or in which he feels he will do creditable work. Both of these elements are interrelated and both may affect the choice of correspondence courses.
3. There may be a difference in the standards of grading correspondence and residence work. At any one time the number of students enrolled in any particular correspondence study course is comparatively small. In a course in residence the group is usually fairly large and grades are distributed according to the normal curve of distribution. The possibilities of receiving a mark of 4 (or 5) are somewhat increased with the increase in size of the group. Then, too, "readers" are sometimes employed to correct and mark the completed assignments in correspondence study. While these readers are competent and do their work with the approval and under the direction of the department concerned they may occasionally award higher marks than would the instructor in residence. As nearly as can be determined by a comparison of random cases the standards of grading correspondence and residence work of this study were not, however, markedly different.
4. Correspondence study may really represent superior work on the part of the students concerned. In many of the courses in residence there is a large enrollment. There is a minimum of pupil reaction and expression. This is markedly true where the only evidence of pupil learning is secured from the mid-term and final examinations. In correspondence study the pupil must make definite preparation for each assignment. He usually confines his efforts to one course at a time. The residence student has several courses—sometimes too many—and seldom prepares and assimi-

lates the suggested work every day. Another important consideration is that the student in correspondence courses may do work at his own rate of speed and take time to think through points not entirely clear. Subjective evidence concerning the effectiveness of correspondence work is forthcoming in the form of opinions of capable superintendents and principals who have taken correspondence work. They agree that many correspondence courses are so planned and conducted that they challenge and develop a student's best efforts, resulting in effective learning and a commendable standard of scholarship. There is far less unanimity of opinion as to the permanency of the learning products of correspondence study courses.

5. Failures and near failures may not become a matter of record in correspondence study courses. Students who receive low marks in correspondence courses quite often drop out of these courses and thus secure a "W" or withdrawal grade rather than a failing mark. Investigation discloses the fact that directors of correspondence study divisions frequently advise students who are doing poor work to withdraw rather than risk the possibility of failure. This practice is decidedly at variance with the policies in vogue in most residence courses. One, all, or none of these explanations may be the true one in the case of different students or even of the same student in different courses.
6. The higher marks secured in correspondence courses do not indicate that the work is of higher quality. If a comparison of quality of work in correspondence and residence courses is to be made it is necessary that objective evidence be made available. Scientific procedure in the form of objective achievement tests, or rotating groups, or some similar plan must be employed as a basis for securing valid data on which sound and defensible policies may be built.

CAUSES FOR LOSS OF INTEREST IN HIGH-SCHOOL SUBJECTS AS REPORTED BY 651 COLLEGE STUDENTS

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THE present study of reasons for loss of interest in high school subjects is based upon written reports from 651 college women attending the State Teachers College, Athens, Georgia. With 19 exceptions they represent 230, 183 and 219 second year students of 1926-27, 1927-28, 1928-29, respectively. No blanks were accepted from individuals who had been out of high school for more than three years. The inquiries were answered carefully and conscientiously, it appeared, as part of a class exercise. Many ambiguous blanks were clarified by means of private conferences. Without explanatory discussions or illustrations the subjects were requested to supply the information, with name, date of graduation, etc., requested in the following questionnaire:

(1) Give the name of a high-school course in which you lost interest, either temporarily or permanently. (2) List the main reasons for loss of interest in the subject. (3) Did you ever regain interest in the subject? (4) If you did regain interest, approximately how many weeks, months or years elapsed before you again liked the subject? (5) Did you ever take another course in the subject after you lost interest in it? (Note: You may name as many subjects and as many reasons as you wish.)

The number naming each subject and the time for regaining interest may be found in Table I which should be read as follows: 234, or 36 percent, of the 651 students specified loss of interest in Latin; of this number, 25.64 percent stated time for regaining interest in terms of years, the average number of years being 1.4. Of the 234 students, 30.77 percent gave time for regaining interest in terms of months, the average number of months being 1.4. Column VII shows that 43.59 percent of the students naming Latin never regained interest in it. However, 40 percent of the group which never revived a liking for the subject had had no further courses in it and so had had no opportunity to renew their interest. An average of 79.8 students named each of the 12 groups of subjects, the mean variation being 53.8. An average of 31 percent of those naming the various courses stated the time for regaining interest in terms of years, the range being from 17 percent to 64 percent and the average deviation 11.2. The range in time is 1.1 to 3.4 years, the mean being 1.8 years and the average deviation 0.4. An average of 38 percent gave the time for regaining interest in terms of months, the range

being from 19 percent to 61 percent and the average deviation 8.9 percent. The range in time is 1.4 to 3.6, the mean being 2.4 months and the average deviation 0.58. The reports for months and years were recorded separately because the former probably referred to brief lapses with regaining of interest under the same teacher, and the latter to more serious, longer lapses with regaining of a more desirable attitude under a different instructor or at quite a different level of maturity. An average of 30 percent of those naming the various subjects indicated that interest in the course specified had never been revived, the range being 0-47 percent and the average deviation 12.14, but an average of 34 percent had never taken further work in the subject named and had therefore lacked opportunity to regain interest. Numbers of students indicated that courses had been dropped before completion; however, a complete record of these observations was not kept. Since some of the courses were grouped, the averages given in Table I are found on the basis of twelve subjects. The popularity of the various subjects cannot be tested by noting the number of students losing interest in them because no record of the number of pupils who had taken all the subjects is available. In Table I and elsewhere, the term "rhetoric" is used to include rhetoric, composition, and grammar.

Three percent of the students stated that they had never lost interest in any subject. The maximum number of subjects mentioned was four

TABLE I

SHOWING THE TIME FOR REGAINING INTEREST

	I	II	III	IV	V	VI	VII	VIII
Subject	Number of Students Naming Subject	Percent of Students Naming Subject	Percent Regaining Interest in Years	Average Years to Regain Interest	Percent Regaining Interest in Months	Average Months to Regain Interest	Percent Never Regaining Interest	Percent (of Col. X) Never Taking Subject Again
Latin	234	36	25.64	1.4	30.77	1.4	43.59	40
French	64	10	20.3	1.4	60.9	2.3	18.8	25
Literature	22	3	63.64	1.1	36.35	3.0	0	0
Rhetoric	70	11	17.14	1.8	57.14	1.4	25.7	0
History	191	29	43.9	1.7	36.13	2.4	19.9	11
Algebra	98	15	33.67	1.6	19.39	3.0	46.94	70
Geometry	119	18	21.85	1.6	31.09	2.0	47.06	63
Mathematics	49	7.5	26.53	1.5	28.57	3.0	44.9	50
Chemistry	31	5	22.6	2.6	38.7	2.4	38.7	33
Physics	26	4	26.9	1.6	38.5	1.4	34.6	89
Biology-Science	24	4	20.8	3.4	50.0	3.6	29.1	29
Sewing-Cooking	30	5	50.0	1.6	33.0	2.8	16.6	0
Averages	79.8	12.3	31.1	1.78	38.38	2.39	30.49	34.17
Average Variation	53.8	8.14	11.15	0.4	8.89	0.58	12.14	23.53

and the average was 1.47. The average number of causes for loss of interest given by each student was 2.58.

The reasons for loss of interest were finally classified under 31 heads (Table II). These headings overlap but this was felt to be preferable to the concealing of factors by large grouping. Although the young women sometimes evidenced a lack of understanding of basic causes the replies represent the students' analyses of their difficulties and are consequently of significance to educators. In Table II is given the frequencies for each of the twelve school subjects according to the 31 reasons listed. The total number of causes for loss of interest in each subject may be found in the column totals. For instance, the total number of causes enumerated for Latin was 364, and 74 or 20 percent of them were "failure to see need for subject." The frequencies for columns 3, 9, 10, 11 and 12 are relatively small, i.e., 37 to 48, so the reader should not attach undue significance to them.

The most frequent cause for a negative attitude, a reason listed by 29 percent of the 651 students, is "failure to see the need for the course." This factor is especially prominent for Latin, for the three mathematics groups and for history. Perhaps the 2 percent who took the subject "because it was required" also belong in this group. The desire for a subject which is of some practical benefit may be an American characteristic, yet its high frequency is surprising since the subjects are young women who are supposedly more likely to conform, with a minimum of questioning, to the status quo.

"Uninteresting material," named by 24 percent, ranks second among the factors and it is rather frequent among the criticisms of all the courses except science-biology. If it be combined with the eleventh point, "no clubs, correlations or applications" the resulting criticism includes approximately 32 percent of the students.

"Monotonous methods" was given by 23 percent as causing a negative attitude. This reason is prominent for all the subjects except physics and chemistry. It may be closely related to the factor next in rank, also listed by 23 percent, that the instructor "could not put it across." While this expression occurred frequently the writer has also used it to include miscellaneous statements which were hard to classify more specifically.

"Difficulty of material," given by 20 percent, is found often in connection with Latin, the three mathematics groups and the sciences. If this reason be combined with "explanations not clear," approximately 33 percent of the students are included. Perhaps some of the 6 percent

who gave "failure on tests" should be added to this number. If such criticisms come from students who were frequently the superior members of the high-school group, and we assume that students who attend college are usually superior to those who do not, what must the average and the poorer students in the secondary schools have felt in regard to the difficulty of the material and the clarity of the explanations?

"Lack of foundation," given by 22 percent, ranks fifth as a factor. It is found especially in connection with foreign languages, the three mathematics groups, physics and science-biology. This reason may be related to the "incompetent, ignorant teacher," specified by 17.2 percent, which occurs usually with average frequency for all the subjects except rhetoric, the sciences and sewing-cooking. "Lack of class activity" is given by 12.9 percent and it is prominent for rhetoric and history. "Teacher not interested in data," named by 11.4 percent, is found especially in the criticisms of literature, rhetoric, and history.

The 31 factors may be grouped under 5 heads, the classification being debatable, as follows: subject matter causes, factors 1, 2, 6, 12, 20 and 23, named by 85 percent; causes based mainly upon method, factors 3, 8, 11, 13, 16, 18, and 26, named by 59 percent; causes, exclusive of method, directly attributable to the instructor, factors 7, 10, 14, 17, 19, 27, 30, and 31, named by 43.6 percent; causes based upon administrative details, factors 24, 25, 28, and 29, named by 3.8 percent; miscellaneous causes, factors 4, 5, 9, 15, 21, and 22, named by 66.9 percent.

Table II may be examined for "causes of loss of interest" for each of the specified subjects, as, the leading reasons, of the 364 listed for Latin, are "failure to see need for subject," 74; "lack of foundation," 38; "difficulty of material," 32; etc. There are many differences among the various subjects as to the main causes, for instance, "failure to see need of subject" is the leading factor for Latin yet it is of minor importance for French and rhetoric and is not even listed for literature.

SUMMARY

The most prominent reasons for loss of interest in high school courses as reported by 651 second year students in a teachers college, were: failure to see a need for the subject (29 percent); uninteresting material (24 percent); monotonous methods (23 percent); inability of the teacher to "put it across" etc. (23 percent); lack of foundation (22 percent); difficulty of material (20 percent); incompetent or ignorant teacher (17 percent). There are wide differences among the various school subjects as to which reasons are most frequent. (Table II)

TABLE II

SHOWING FREQUENCIES FOR THE VARIOUS SUBJECTS UNDER THE 31 HEADINGS

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
	Latin	French	Literature	Rhetoric	History	Algebra	Geometry	Mathematics	Chemistry	Physics	Sci.-Bio.	Sew.-Cook.	Total	Percent of 651 Students
1. Failure to see need for subject	74	5	—	7	30	23	31	11	3	2	1	1	188	28.9
2. Material uninteresting, etc.	29	7	4	13	23	22	27	13	4	4	1	10	157	24.1
3. Monotonous methods	31	10	8	12	42	18	12	7	—	1	3	5	149	22.89
4. Teacher couldn't "put it across," etc.	20	11	7	14	31	21	22	9	4	4	5	1	149	22.89
5. Lack of foundation	38	8	2	8	10	25	30	10	3	4	5	—	143	21.97
6. Material too hard, etc.	32	2	—	—	16	31	29	7	6	5	3	—	131	20.1
7. Incompetent, ignorant teacher	27	8	6	6	21	14	16	7	1	2	2	2	112	17.2
8. Lack of class activity, etc.	7	4	—	19	32	11	5	3	1	—	2	—	84	12.9
9. Explanations not clear	5	—	5	5	12	20	17	6	3	5	4	1	83	12.75
10. Teacher not interested in subject	16	—	5	11	19	10	7	3	2	—	—	1	74	11.4
11. No clubs, correlations, applications, etc.	18	6	3	10	10	5	—	—	—	—	—	—	52	7.99
12. Preferred other subjects	8	1	—	—	9	6	5	—	5	2	3	11	50	7.7
13. Did not have to study	15	—	1	3	17	5	4	2	—	—	—	—	47	7.2
14. Disliked teacher (nagging, sarcasm, or temper)	13	3	2	6	11	4	2	1	—	—	—	3	45	6.9
15. Failed on test or exam.	2	9	—	—	7	9	3	6	1	—	—	—	37	5.7
16. Didn't know how to study	6	—	—	1	—	7	4	3	1	3	—	—	25	3.8
17. Teacher partial, unfair	5	5	1	1	8	1	2	—	—	—	1	1	23	3.5
18. Disorderly class	3	—	—	2	4	5	3	2	1	—	—	—	20	3.1
19. Changed teachers often	6	1	—	—	3	1	2	4	1	—	1	—	19	2.9
20. Overstressed wars	1	—	—	—	15	—	—	—	—	—	—	—	16	2.5
21. Lazy, neglectful	4	—	—	—	—	2	4	1	—	—	—	1	12	1.8
22. Prejudiced vs. it	3	—	—	—	1	3	1	4	—	—	—	—	12	1.8
23. Took it because required	1	—	—	—	3	3	1	2	—	—	—	1	11	1.7
24. Class too large	—	—	—	—	5	2	—	—	1	—	—	1	9	1.4
25. Lacked lab. equipment	—	—	—	—	—	—	—	—	2	1	2	2	7	1.1
26. Disliked lab. work	—	—	—	—	—	—	—	—	2	3	2	—	7	1.1
27. Teacher (old, sick, or absent-minded)	1	—	1	—	2	—	1	1	—	—	—	—	6	0.9
28. Late P.M. class	—	—	—	—	—	—	—	—	—	1	3	1	5	0.8
29. No time to study	1	—	—	—	2	—	—	—	—	—	—	—	3	0.5
30. Voice of teacher unpleasant	—	—	3	—	—	—	—	—	—	—	—	—	3	0.5
31. Teacher disliked children	—	—	—	—	1	—	1	—	—	—	—	—	2	0.3
Total no. reasons for each subject	364	80	48	118	334	248	229	102	41	37	38	42		

Several factors which are often emphasized in texts on educational method appear, from this study, to be relatively unimportant. Certain personality traits of the teacher, such as temper, sarcasm, nagging, partiality, unfairness, old age, illness, absent-mindedness, voice, dislike of children, etc., have low rankings individually and when combined they

have been named by only 12 percent of the students. Almost as many, *i.e.*, 11 percent, gave "teacher not interested in subject," and 17 percent specified "incompetent, ignorant teacher." Other items often stressed by educators but which appear to be of little significance here are, ignorance of how to study, lack of time for study, discipline, size of class, and time of recitation, the total being 9.6 percent. Yet this may indicate, not the unimportance of these problems, but the inability of the students to analyze basic causes. Withal the fact remains that lack of practical, vital curricula and the frequency of monotonous, ineffective methods merit serious study.

In a grouping of the 31 factors, "subject-matter causes" are named by 85 percent, "method-causes," by 59 percent; "teacher-causes," by 43.6 percent; administrative-causes, by 3.8 percent; miscellaneous causes, by 66.9 percent. The mean number of subjects in which each student lost interest was 1.47. An average of 2.58 reasons was given by each pupil. For the average of 31 percent who stated time for regaining interest in terms of years the mean time was 1.8 years, and for the average of 38 percent who gave it in months, the mean time was 2.4 months. An average of 30 percent never overcame their negative attitude toward the course named, but 34 percent of these had had no further work in the subject.

MEASURING MUSICAL ABILITY AND ACHIEVEMENT: A STUDY OF THE CORRELATIONS OF SEASHORE TEST SCORES AND OTHER VARIABLES

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THE immediate purpose of the present study is to investigate the validity of the Seashore Tests of Musical Talent. But it is also hoped that some light may be thrown on a few of the general problems in measuring musical ability and achievement, and particularly on the types of criteria for validation that are appropriate.

The Seashore Tests for Sense of Pitch, Sense of Intensity, Sense of Time, Sense of Consonance, Tonal Memory, and Sense of Rhythm were given to 176 second, third, and fourth year students at Lawrence College. Of these, 88 were enrolled in the College of Liberal Arts, and 88 in the Conservatory of Music. The instructions in the *Manual of Instructions and Interpretations*[1] were carefully followed. The groups tested together varied in size from 20 to 45. Not more than two tests were given at one sitting. Preliminary corrections were made by the subjects, the experimenter reading from the scoring key. The raw scores were converted in accordance with the adult norms published in the Manual.

For the semester previous to the one in which this investigation takes place the grades for piano and voice in Applied Music were obtained for the conservatory students. The piano and voice fields were chosen on account of the larger examining committee. Grading by the committee contributed 25 percent to the student's final semester grade in all his Applied Music, while the individual instructor's grading contributed 75 percent. In addition, all of the conservatory students were rated for talent by every instructor at Lawrence under whom they had studied for at least one semester. Grades and average talent ratings were converted into percentiles.

THE TEST SCORES

The essential data with regard to the test scores will be found in Tables I, II, and III.

[1] Seashore, C. E. *Manual of Instructions and Interpretations for Measures of Musical Talent.* Chicago: C. H. Stoelting Co.

TABLE I

POPULATION, ARITHMETIC MEAN, AND STANDARD DEVIATION FOR SEASHORE TESTS

	Pitch	Intensity	Time	Consonance	Memory	Rhythm
N.	164	171	170	165	167	164
A.M.	60.06	61.84	57.2	65.7	68.5	78.3
S.D.	28.35	27.73	30.9	27.07	25.6	21.4

With regard to the intercorrelations, various explanations of the relationships between these tests have been advanced, notably by Seashore and Mount.[2] Malmberg[3] also discusses the relationship of the consonance test to others in the battery.

TABLE II

INTERCORRELATIONS OF SEASHORE TEST SCORES

	Intensity	Time	Consonance	Memory	Rhythm
Pitch	.30	.24	.33	.49	.22
	.32	.30	.78	.52	—
	.25	.20	.29	.52	.16
	—	.37	—	—	.32
Intensity		.51	.28	.21	.32
		.23	.24	.20	—
		.40	—.04	.00	.23
		—	—	—	—
Time			.085	.29	.23
			.48	.28	—
			.09	.20	.00
			—	—	.52
Consonance				.55	.09
				.75	—
				.22	.00
				—	—
Memory					.38
					—
					.33
					.56

In each cell the first item is the correlation here obtained, the second is from Ruch and Stoddard[4] for 210 college students, the third is from Brown[5] for 108 high-school students, the fourth is from R. Seashore[6] for 44 subjects.

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[2] Seashore, C. E., and Mount, G. H. "Correlation Factors in Musical Talent and Training," *Psychological Monographs*, XXV (1918), pp. 47-92.

[3] Malmberg, C. F. "The Perception of Consonance and Dissonance," *Psychological Monographs*, XXV (1918), pp. 92-133.

[4] Ruch, G. M., and Stoddard, G. D. *Tests and Measurements in High School Instruction*. Yonkers, New York: World Book Company, 1928.

[5] Brown, A. W. "The Reliability and Validity of the Seashore Tests of Musical Talent," *Journal of Applied Psychology*, XII (1928), pp. 468-476.

[6] Seashore, R. H. "Studies in Motor Rhythm," *Psychological Monographs*, XXXVI (1926), pp. 142-189.

More important than any special interpretation of this kind is the general level of the intercorrelations, which is, with a few exceptions, low. This has been a matter for some comment. Brown[7] remarks that the tests evidently measure quite disparate factors, which might show different relationships if combined. And Spearman[8] has shown by his tetrad difference technique that the Seashore Tests fail to reveal any common group factor of musical ability, which may indicate either that there is no such factor, or that the tests cannot reveal it, even though it may exist.

TABLE III

AVERAGE OF INTERCORRELATIONS FOUND IN THREE STUDIES OF THE SEASHORE TESTS

This study	AM.	.302
Ruch and Stoddard	AM.	.41
Brown	AM.	.19

RELIABILITY OF THE SEASHORE TESTS

Reliability coefficients for each of the six tests were obtained by correlating the first and last five rows of the score tables, and applying the Spearman-Brown prophecy formula:

$$r_{11} = \frac{2r_h}{1 + r_h}$$

The results are brought together in Table IV. The applicability of this formula to the Seashore Tests has been debated by Farnsworth[9] and Lanier.[10] There seems to be no serious objection to its use. Indeed, it may even be argued that the correlation of comparable halves will yield a better measure of reliability than self-correlation *in toto*, especially if the tests are repeated only a short time after the first administration. This is due to their fatiguing and monotonous character.

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[7] Brown, A. W. *Op. Cit.*

[8] Spearman, C. *The Abilities of Man.* New York: The Macmillan Company, 1927.

[9] Farnsworth, Paul R. "The Spearman-Brown Prophecy Formula and the Seashore Tests," *Journal of Educational Psychology*, XIX (1928), pp. 586-588.

Farnsworth, Paul R. "Reply to Dr. Lanier's Note on the Seashore Tests," *Journal of Educational Psychology*, XX (1929), pp. 693-694.

[10] Lanier, Lyle H. "Prediction of the Reliability of Mental Tests and Tests of Special Abilities," *Journal of Experimental Psychology*, X (1927), pp. 69-113.

Lanier, Lyle H. "Note on the Reliability Predictions for the Seashore Music Tests," *Journal of Educational Psychology*, XX (1929), pp. 691-692.

TABLE IV

RELIABILITY COEFFICIENTS FOR THE SEASHORE TESTS

	This Study		Ruch and Stoddard[11]		Brown[12]		Farnsworth[13]*	
	r	N	r	N	r	N	r	N
Pitch	.66	161	.70	100	.71	93	.84	328
Intensity	.86	164	.66	100	.65	91	.67	328
Time	.81	164	.53	100	.48	91	.63	142
Consonance	.52	165	.32	100	.43	91		
Memory	.88	159	.66	100	.59	90		
Rhythm	.64	163	.50	58	.29	89		

* Coefficients given for Farnsworth were calculated from his data by the present writer.

Since the interpretation of a reliability coefficient depends largely upon the range of ability for which it is computed, it was thought advisable to find the standard error of estimate for the tests. This was possible with only one study besides our own, namely that of Brown, which alone gives the standard deviations for the tests. The results are reported in Table V.

TABLE V

STANDARD ERROR OF ESTIMATE ($\sigma_{est.} = \sigma_{dis.} \sqrt{1 - r_{11}}$) AND RATIO OF STANDARD ERROR OF ESTIMATE TO STANDARD DEVIATION FOR THE SEASHORE TESTS

	This study		Brown	
	$\sigma_{est.}$	$\frac{\sigma_{est.}}{\sigma_{dis.}}$	$\sigma_{est.}$	$\frac{\sigma_{est.}}{\sigma_{d.}}$
Pitch	16.44	.58	9.27	.53
Intensity	10.26	.37	3.6	.59
Time	13.04	.43	6.77	.72
Consonance	18.69	.69	8.85	.75
Memory	8.96	.35	10.36	.56
Rhythm	12.84	.60	7.9	.84

Our interest in reliability is twofold. First, the obtained coefficients furnish a certain check upon the adequacy of the testing. This point is brought out by Seashore,[14] who criticizes certain studies on the ground that the low reported reliabilities are evidence of improper testing procedures. The general agreement of our results with those of other studies would indicate that disturbing factors are not present to any abnormal degree in the testing. This point is one principal reason why, in research

[11] Ruch, G. M., and Stoddard, G. D. *Op. cit.*

[12] Brown, A. W. *Op. cit.*

[13] Farnsworth, Paul P. "The Spearman-Brown Prophecy Formula and the Seashore Tests," *Journal of Educational Psychology*, XIX (1928), pp. 586-588.

[14] Kelley, T. L. *Interpretations of Educational Measurements.* Yonkers, New York: World Book Company, 1927.

work on the Seashore Tests, reliability coefficients should always be computed.

Besides this, reliability data are essential in evaluating the practical significance of test results. In particular, it has been urged that the Seashore Tests be employed to measure, not only differences within groups, but idiosyncracies within the individual. Seashore[15] sponsors this use of the tests, and we find typical applications by Gaw[16] and Schoen.[17] Talent profiles are constructed directly from the test scores, but so far as the writer knows, the relevancy of reliability to this procedure has never been discussed. Clearly, however, this is an essential point. And when we consider the large standard errors of the tests, and above all, the fact that in so many cases these are more than .5 times the standard deviation, this use of the scores seems entirely inadmissible. The facts may be presented from yet another point of view if we scan the standard errors between standard scores on pairs of tests, as given in Table VI. In only one case would a difference of one standard score be statistically reliable (twice the standard error). So once more we have reason to reject the claim that these tests are capable of measuring idiosyncracies, and are diagnostic of individual musical type. Their value lies in their capacity to differentiate extremes within groups.

TABLE VI

STANDARD ERROR OF THE DIFFERENCE IN STANDARD SCORES BETWEEN PAIRS OF SEASHORE TESTS ($\sigma_d = \sqrt{2 - r_{11} - r_{22}}$: Kelley*

	Intensity	Time	Consonance	Memory	Rhythm
Pitch	.69	.72	.85	.68	.84
Intensity		.65	.79	.50	.70
Time			.81	.56	.74
Consonance				.77	.92
Memory					.69

* Kelly, T. L., *op. cit.*, p. 184.

VALIDITY OF THE SEASHORE TESTS

In the literature of the Seashore Tests we find three types of validation criteria that have been applied. These are, institutional selection, measures of general musical capacity, and specific tests of special musical abilities such as sight singing. This classification is rough, but it will help us to gain a clear-cut notion of what the tests measure. Moreover, the

[15] Seashore, C. E. *The Psychology of Musical Talent.* Newark: Silver, Burdett and Company, 1919.

[16] Gaw, Esther Allen. "A Survey of Musical Talent in a Music School," *Psychological Monographs,* XXXI (1922), pp. 128-156.

[17] Schoen, Max. "The Validity of Tests of Musical Talent," *Journal of Comparative Psychology,* III (1923), pp. 101-121.

criteria here discussed are those which would most naturally be used for validating any music tests; and so it is hoped that an enumeration and brief analysis of them may serve a purpose beyond the more immediate scope of this paper. In connection with validation, it is essential to bear in mind that the Seashore Tests show no significant correlation with general musical training, and that scores are not significantly affected by specific training in the abilities which the separate tests measure (Pitch, Memory, etc.). The studies on which this result depends are too extensive to summarize here. But this assumption is generally accepted by Seashore, himself, and his co-workers.

A. *Validation by institutional selection.* By this is meant the extent to which the Seashore Tests discriminate between those who become members of, or retain membership in, some music school or active musical organization. The relevant findings from the present study are reported in Table VII.

TABLE VII

AVERAGES, POPULATIONS, AND MEDIAN OVERLAPPING OF COLLEGE AND CONSERVATORY STUDENTS ON SEASHORE TESTS

	College students		Conservatory students		Diff. AM. conservatory — AM. college	PE. dif.	Percent conservatory students who equal or excel median college students
	AM.	N	AM.	N			
Pitch	53.7	83	66.5	81	11.8	2.9	69
Intensity	57.0	82	66.2	89	9.2	2.7	56
Time	63.1	85	51.6	85	12.5	2.9	49
Consonance	57.4	88	75.2	77	17.8	2.9	70
Memory	64.8	90	72.8	77	8.0	2.6	89
Rhythm	76.8	88	80.0	76	3.2	2.2	60
Average	58.5	93	72.5	83	14.0	1.8	80

The data unmistakably indicate that the influences which bring a student into the Lawrence Conservatory tend to select the abilities measured by the Seashore Tests. This finding is directly comparable with that of Stanton, reported in Table VIII.

TABLE VIII

PERCENTAGES RETAINED IN THE EASTMAN SCHOOL AFTER A GIVEN TIME: N = 300. *from* STANTON[18]

	Percentages of each classification on the Seashore Tests remaining in the school					
	E	D	C—	C	B	A
Tested in 1921-2 remaining Jan. 1924	0	0	29	49	57	67
Tested in Oct. 1922 remaining Jan. 1924	0	11	57	70	75	92

[18] Stanton, Hazel M. "Seashore Measures of Musical Talent," *Psychological Monographs*, XXXIX (1928), pp. 135-144.

The results of a study by William Larson[19] also point in the same direction. He investigated the Seashore Test performances of pupils in four groups in school music: I. One hundred twenty-five pupils in beginning instrumental classes; II. Thirty members of junior high-school orchestra; III. Thirty-one members of a junior high-school advanced orchestra; IV. Fifty members of a senior high-school advanced orchestra. Different individuals were involved in each group, so that we have no picture of movement from elementary to advanced groups of the same individuals. For these four groups, the average performance on all six tests was as follows: I, 52.1; II, 49.1; III, 66.0; and IV, 73.2.

To sum up, we have convincing evidence that the Seashore Tests discriminate between the abilities that select students for music schools, that tend to retain them in music schools, and that select them for active musical organizations in school music.

B. *Validation by general measures of musical capacity.* Our study includes two such criteria, grades in Applied Music and estimates of musical talent. Applied Music grades at Lawrence Conservatory are assigned on a scale of 100 points, with 70 as the passing grade. They are resultants of the average grade assigned by the committee before which the student performs, the average being weighted 25 percent and the grade of the instructor with whom the student has studied, which is weighted 75 percent.

In securing average talent ratings, the following form was sent to all instructors in Applied Music: "You are asked to rate those of the following students whose work you know, on their musical talent. As far as possible disregard their present status as performers, *i.e.*, whether they are advanced or elementary, and their personal characteristics, and state what you think of their musical talent as such. In rating use the numbers from 1 to 10. Number 1 should mean exceptionally talented, 10 should mean exceptionally deficient, and 5 about average. Normal expectation would be that few would have ratings of 1 or 2 or 9 or 10, and most would rate about 5. You are asked to select only students whom you have had for at least one semester. Your rating will be strictly confidential, and will in no way affect the student's standing in the school, or chance of employment. Please sign the list before returning it." All ratings were made independently, and without any conference. An

[19] Larson, William S. "Measurement of Musical Talent for the Prediction of Success in Instrumental Music," *Psychological Monographs*, XL (1930), pp. 33-73.

average rating was calculated for each student who was rated by at least three teachers, and the averages were converted into percentiles.

Tables IX, X, and XI bring together the most important zero order correlations among the criterion items. In general, the correlations indicate the reliability of the criteria, for we find a marked agreement among the grades and talent ratings assigned by the various instructors. This is really somewhat surprising, and is evidence that the considered opinion of expert musicians has very considerable worth.

TABLE IX

CORRELATIONS OF GRADES BY INDIVIDUAL MEMBERS OF EXAMINING COMMITTEES IN VOICE AND PIANO AND COMMITTEE AVERAGE

Voice	r	N	Piano	r	N
Instructor I	.902	52	Instructor I	.87	46
Instructor II	.892	52	Instructor II	.88	46
Instructor III	.93	52	Instructor III	.91	46
Instructor IV	.765	52	Instructor IV	.905	46
Average	.87		Instructor V	.94	46
			Instructor VI	.89	46
			Average	.899	

TABLE X

CORRELATIONS BETWEEN GRADES BY EXAMINING COMMITTEE AND FINAL SEMESTER GRADES

	r	N
Voice examination grade—voice final grade	.795	51
Piano examination grade—piano final grade	.83	46
Piano final grade—voice final grade	—.02	29

TABLE XI

CORRELATIONS BETWEEN TALENT RATINGS BY ALL INSTRUCTORS RETURNING TEN OR MORE RATINGS AND AVERAGE RATINGS

	r	N		r	N
Instructor I	.73	19	Instructor VI	.98	16
Instructor II	.87	15	Instructor VII	.80	15
Instructor III	.87	17	Instructor VIII	.90	14
Instructor IV	.80	11	Average Correl.	.82	
Instructor V	.63	27			

The correlation between talent rating and final grade on piano is .46 ± .06, and that between talent rating and final grade on voice is .50 ± .07. This compares with the relationship frequently found for college students between intelligence test scores and grades. The correlation of average talent ratings by all piano instructors with the average talent ratings by all voice instructors is .49 ± .08. When piano and voice grades are held constant, this correlation becomes .56. So small a modification would suggest that examination and final grades have little influence upon talent ratings, and that the latter may be accepted as an independent criterion.

TABLE XII

CORRELATION OF TEST SCORES WITH CRITERIA

	Talent rating		Piano final grade		Voice final grade	
	r	PE.	r	PE.	r	PE.
Pitch	.11	.08	.01	.09	.07	.10
Intensity	.07	.08	.09	.09	.08	.10
Time	.20	.07	.10	.08	—.14	.10
Consonance	—.27	.07	—.25	.09	.06	.10
Memory	.19	.08	.07	.09	.05	.10
Rhythm	.25	.07	.20	.08	.06	.10
Average	.08	.07	—.15	.08	.08	.10

Table XII brings together the correlations of the test scores with the criteria. The virtually complete absence of relationship is most striking. The results should be compared with those of Brennan[20] who had the performance of 20 students judged by musically expert and inexpert judges, and of Brown,[21] who correlated Seashore Test scores with talent ratings by a musical instructor, for 108 high-school students. Clearly the Seashore Tests show little or no relationship with musical talent as assessed by competent musicians, and if this latter is not a good criterion, where shall we find one?

TABLE XIII

CORRELATIONS WITH CRITERIA REPORTED BY BRENNAN AND BROWN

	Brennan						Brown	
	Performance rated by expert musicians		Performance rated by non-musicians		Amount of musical training		Talent ratings	
	r	PE.	r	PE.	r	PE.	r	PE.
Pitch	.27	.14	—.03	.17	.42	.12	.15	.06
Intensity	.17	.14	.12	.17	.25	.14	.11	.06
Time	.23	.14	.18	.17	.38	.12	.15	.06
Consonance	.28	.14	.18	.17	.32	.17	.17	.06
Memory	.47	.12	.38	.15	.55	.10	.41	.05
Rhythm	.47	.12	—	—	.74	.07	.17	.06
Average	—	—	—	—	—	—	.38	.05

C. *Validation by special tests.* Our study has no bearing on this question, and we here summarize the most important findings for completeness sake. Gaw[22], for 149 cases, found the following correlations for her sight singing test with the Seashore Tests: pitch .46, intensity .36,

[20] Brennan, F. "The Relation between Musical Capacity and Performance," *Psychological Monographs*, XXXVI (1926), pp. 190-248.

[21] Brown, A. W. "The Reliability and Validity of the Seashore Tests of Musical Talent," *Journal of Applied Psychology*, XII (1928), pp. 468-476.

[22] Gaw, Esther Allen. "Five Studies in the Music Tests," *Psychological Monographs*, XXXIX (1928), pp. 145-156.

memory .56. Mosher[23] obtained coefficients decidedly lower between his group measures of sight singing and the Seashore Tests: time .3581, consonance .2912, pitch .4391, memory .4386, and intensity .485. These were found for numbers varying from 430 to 460. Wright[24] found correlations for 24 cases between her three sets of music achievement tests and the Seashore Battery as a whole of .45, .51, .73. Smith[25] found correlations between singing ability of .71 for 234 boys and .51 for 274 girls as estimated by musical instructors on the basis of capacity to sing a tone or a melody. Such results suggest that the Seashore Tests may be more adequate in indicating special musical abilities than in making fine discriminations in general musical ability in populations already selected for this capacity. In this connection it should be noted that Seashore[26] has protested against the validation of the tests against undifferentiated groups. In any case it is quite clear that the intercorrelation of tests and measures of all kinds is one of the major research problems in music education.

SUMMARY

1. The Seashore Tests were found to have low intercorrelations, confirming previous studies. This may indicate either that there is no such thing as unitary musical capacity, or that these tests do not measure it.

2. Reliabilities were found by correlating the first and second five rows of the scoring tables and applying the Spearman-Brown prophecy formula. This appears defensible, and may be even better than self-correlation of the complete tests.

3. Reliabilities so obtained were approximately similar to those of previous studies, thus confirming the testing procedure.

4. Reliabilities as revealed by the standard error were so low that the use of the tests for individual diagnosis seemed questionable.

5. In most of the tests, the performance of conservatory students was superior to that of college students, measured both by averages or median

[23] Mosher, R. M. *A Study of the Group Method of Measurement of Sight Singing.* Contributions to Education, No. 194. New York: Teachers College, Columbia University, 1925.

[24] Wright, F. A. "The Correlation between Achievement and Capacity in Music," *Journal of Educational Research,* XVII (1928), pp. 50-56.

[25] Smith, F. O. "The Effect of Training in Pitch Discrimination." *Psychological Monographs,* XVII (1914), pp. 47-103.

[26] Seashore, C. E. "Measures of Musical Talent: A Reply to Dr. Heinlein," *Psychological Review,* XXVII (1930), pp. 178-183.

overlapping. This superiority was not sufficiently marked to warrant any very specific educational advice.

6. Grades in Applied Music, and estimates of musical talent seemed to have a reliability which should render them good validation material.

7. There was almost no relationship between Seashore Test performance, and the above criteria. Taken with similar results from other studies, this leads to the conclusion that the tests cannot make fine discriminations of true musical talent within musical groups.

8. The relationship of the Seashore Test scores to performance on special tests indicates that the former may be of use as aids in diagnosing special musical abilities.

9. Where significant correlations between Seashore Test scores and tests of special musical abilities and types of achievement are found, we are usually dealing with very heterogeneous groups, which indicates that the battery may be able to discriminate roughly, though it cannot do so very accurately or finely.

SHORTER ARTICLES

THE COMPARATIVE RELIABILITIES OF STANDARDIZED AND TEACHER-MADE ACHIEVEMENT TESTS WHEN GIVEN IN THE MIDDLE OF THE YEAR

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George Washington High School
and
PERCIVAL M. SYMONDS
Teachers College, Columbia University

THE purpose of this study was to see how the reliability of a standardized achievement test based upon the work of a whole term is affected when it is given in the middle of the term. It was carried on in April, 1930, at the George Washington High School, New York City. Three classes consisting of 86 boys and girls who were studying 9A algebra (i.e., the first half of the elementary algebra) were given (1) the school midterm examination based upon the work of ten weeks and (2) Forms A and B of the Columbia Research Bureau Algebra Test. The school examination was written at the end of the tenth week, and the standardized test was written at the beginning of the eleventh week. The school examination was made up in the form of a standardized achievement test, so that the papers might be rated as objectively as possible. The following are some comparative figures concerning the two papers written by the pupils.

	School Examination	Standardized Achievement Test	
		Form A	Form B
Maximum score	56	63	63
Range of scores	56 to 21	28 to 7	30 to 8
Median score	42.6	18.8	17.8
σ	7.5	4.8	4.2

The following correlations were computed:

1. Between the school examination and Form A..... .53 + .052
2. Between the school examination and Form B..... .62 + .045
3. Between the odd numbered questions on the school examination and Form A..... .46 + .057
4. Between the odd numbered questions on the school examination and Form B..... .55 + .051
5. Between the even numbered questions on the school examination and Form A..... .48 + .056
6. Between the even numbered questions on the school examination and Form B..... .60 + .046

7. Between the odd numbered and the even numbered questions on the school examination..... .74 + .03
8. Between Forms A and B of the standardized test..... .72 + .03
(When given at the end of the term this correlation is .89.)

The study seems to demonstrate that the standardized test lost much of its reliability when given in the middle of the term, the difference between .72 and .89, than when given at the end of the term. The school examination had practically the same reliability in the middle of the term as the standardized test did at the end of the term. The lower correlation between the school examination and the standardized test indicates that they were not measuring the same functions in algebra.

From these data it may be concluded that when given in the middle of the year a standardized test contains much unused material and thereby loses in effective reliability. Greater reliability of testing can be obtained in the middle of the year by using a teacher-made examination based on the material covered by the class than by a more comprehensive standardized test.

AN EXPERIMENT IN COÖPERATION

GEORGE FORLANO
*For the Committee**

THIS study aims to measure the coöperative behavior of a child when subjected to different incentives. Dr. J. B. Maller's book *Competition and Coöperation* suggested this experiment. His problem was to investigate the behavior of children under the motives of individual competition and group competition.

In order to measure the amount of work done, a simple cancellation test was employed. The number of e's cancelled by each child working under the incentive of a possible prize for himself was taken arbitrarily as a standard for comparison. The work done or the number of e's cancelled under incentives other than that of self-gain afforded us a measure for ascertaining the strength of each in producing coöperative behavior.

The investigation involved 34 children who were pupils in an afternoon private language school. There were 19 boys and 15 girls. Of

* Note: This experiment was undertaken under the guidance of Professor Goodwin Watson of Teachers College, Columbia University. The committee of students of 2080 (Psychology of Character) who carried out the experiment were Ben. Schegloff, Anna Reigart, Jack Eisenson, and George Forlano.

these children 10 were in class A, 14 in class B, and 10 in class C. The social-economic status was about city average. Their grade status and educational achievement in public school was slightly above average. The median C.A. was 11 years 9 months, median M.A. 12 years 8 months, median I.Q. 109 and the median school grade was the sixth.

Each child was given a booklet consisting of 13 sheets each of which had 15 lines of typewritten letters selected at random.

(1) *Practice Periods.*—The examiner said, "We are going to have a play test. You are to cross out as many e's as possible. You will not get credit for this practice work, so write at the top of your paper just this word: 'Practice'." After working for 60 seconds the children were told to stop work and to keep their papers.

(2) *Work for Self.*—"Now everyone is going to work for himself. The one making the highest score is going to get a prize, a good book. Therefore, write your name at the top of this sheet." After one minute papers were collected. Score was based on the number of "rights."

(3) *Work for Class.*—"Now you are going to work for the benefit of your class. Remember, this work will not count toward your own score, therefore, do not write your name on this sheet, but write your class 'Class B.' You are not competing with anybody, but if the class makes a high score it will have the honor of being included in our 'Golden Book'." The children worked for one minute.

(4) *Team Work.*—Two captains were chosen, both of the same sex, and then the teams were selected. The examiner said, "Now the children of group I are going to compete against the children of group II. The group making the higher score will edit, mimeograph, etc., the next issue of our school magazine." The children worked for one minute.

(5) *Sex Competition.*—Each class was divided into two groups according to sex. "We want to see who can work the faster, the boys or the girls. Remember all the boys here are working against all the girls, but no prize shall be awarded." Again the children worked for one minute.

In order to eliminate the effect of practice, the first ten tests were given in the following order: (1) Practice, (2) Self, (3) Class, (4) Team, (5) Sex, (6) Practice, (7) Sex, (8) Team, (9) Class, (10) Self.

After the tests had been rotated the children still had three tests left. These were used as "Free Choice" tests. The examiner gave the following directions: "You may begin to work for one minute on each of these sheets as you did before, but you may credit them toward your

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own score, toward your class, team or sex." These same directions were repeated before the work on each of the next two papers was begun.

Using class A as an example, the results of each class were treated in the following manner. If we take the self scores as a base we find that among ten cases nine self scores were larger than the class score. A self score is that rating which the child made in the cancellation test under the motive of self-gain; a class score is that rating which the child obtained on the cancellation test under the motive of working for the class. We may measure somewhat roughly the superiority of one motive over the other by a comparison of the two scores of the child, namely, his self-score and his class score. This same procedure was followed for the other motives. When the three classes were combined the average self-score was 36.28; average class score, 35.05; average team score, 35.82, and the average sex score was 37.78. The differences between the averages, class-self, team-self, and sex-self were −1.23, −.46, and +1.5, respectively.

TABLE I

DIFFERENCE BETWEEN THE AVERAGE SCORES MADE WITH DIFFERENT MOTIVATIONS

Motives	Differences between Two Averages		
	Class I	Class II	Class III
Class minus Self	−3.2	+1.2	−2.55
Team minus Self	−2.4	+1.6	−1.65
Team minus Class	+0.8	+0.4	+0.8
Sex minus Self	−0.8	+3.6	+1.4
Sex minus Class	+2.4	+2.4	+4.0
Sex minus Team	+1.6	+2.0	+3.0

Were the differences between the averages, i.e. between class minus self, team minus self and sex minus self, statistically significant? Of the three, the difference between self and sex (1.50) was the largest. This difference was 2.63 times its standard error. Those for class-self and team-self were respectively 1.68 times its S.E. and .74 times its S.E.

The coefficients of correlation between self scores and team scores, between sex scores and self scores, and between class scores and self scores were .92, .93, and .88, respectively.

A group intelligence test, the Pintner Rapid Survey (Forms A and B) was given to classes A, B, and C. The three classes were combined into one group and the following coefficients of correlation were obtained:

r, M.A. and coöperativeness score (class-self) = .02
r, C.A. and coöperativeness score (class-self) = .09
r, I.Q. and coöperativeness score (class-self) = .07

The comparison of boys and girls, although the numbers were small (Table II), agreed with Maller in finding girls more willing to give to the class and to work for the class. The new motives in this experiment suggested that team competition and sex competition called forth in boys coöperative effort that was superior to their effort in individual competition, and superior, also, to the coöperative effort put forth by girls. The free choice contributions of the boys, however, were emphatically for personal credit.

TABLE II

COMPARISON OF MOTIVATION IN BOYS AND IN GIRLS

	Comparison of Achievement			Free Choice Contributions Percent of Problems Given by Each Sex		
	Class-Self	Team-Self	Sex-Self	For Class	For Sex	For Self
15 Boys	—.93	.07	1.93	32	13	55
9 Girls	—.16	—.28	1.44	48	23	29

SOME LIMITATIONS

1. We were not able to ascertain the exact reliability of the cancellation test.

2. The number of children was too small for conclusive results.

3. It is not certain whether the various prizes offered the children were equally attractive to all the class.

4. We arbitrarily named the difference (class-self) coöperativeness score. It may have little relationship to more valid measures of cooperation.

5. The period of work under each motive, two periods of 60 seconds each, was too short for any motive to reveal its full effects.

RESULTS AND CONCLUSIONS

1. In general the results of the tests given to the three groups of children were consistent.

2. There is a tendency for the average child to work with greater zeal and efficiency for personal gain than for the sake of helping his class, or even his team, although for the latter the difference was not as great.

3. It appeared that the motive of sex competition at this age was distinctly stronger than personal gain. The difference between the averages (sex competition minus self-gain) was 2.63 S.E.

4. Superior work for self or for class was unrelated to chronological age, mental age, or I.Q.

5. The superior coöperativeness of girls or boys seems to be a function of the type of motive employed and the method of coöperation.

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Miami University, Oxford, Ohio.

COOPER, HERMANN. *An Accounting of Progress and Attendance of Rural School Children in Delaware.* New York: Bureau of Publications, Teachers College, Columbia University, 1930. xii + 150 pp.

Taking the 2,067 pupils who entered the first grade in all Delaware schools outside of Wilmington in the fall of 1915, Cooper finds that 1,009 permanently withdrew before the end of the eight-year period. Of these withdrawals, 34 percent were entirely lost, no one apparently knowing what has become of them. Of the 1,058 pupils who remained, the records for 226 are so incomplete that they cannot be used for the purposes of this study. The investigation covers 832 pupils for whom complete records are available.

Mr. Cooper's excellent summaries provide the following conclusions:

1. Fifty percent of the 1915 entrants to grade I were lost by the close of the school year 1922-23, 29 percent of which loss is due to moving of families to Wilmington or outside the State, and 34 percent is unaccounted for.

2. One-half of the 1915 entrants were not promoted to grade II.

3. One out of every twenty 1915 entrants made rapid progress during the eight-year period, one out of four made normal progress, and seven out of every ten made slow progress.

4. Children entering school under six years of age made slower progress than any other age group. Over-age pupils made rapid progress in grades I, II, and III, but suffered losses later.

5. Non-attendance accounted for 95 percent of the retentions in grade I, while in the upper grades non-attendance is accountable for half of the non-promotions.

6. The best attendance percentages were attained in those years when the schools were open the longest.

7. The average pupil lost by non-attendance, one year out of five; likewise, the average pupil lost through non-progress one year out of every five spent in school. If he attended 32 weeks or more, he had eight chances in nine of being promoted; 14 to 18 weeks, one chance in two; less than 7 weeks, one chance in five.

8. The attendance percentages were best in the fully graded schools, and the poorest in one-teacher schools.

9. Pupils who entered at six or seven years of age attended school more regularly than other age groups.

10. The average pupil was absent after enrollment one and one-fifth years and non-enrolled for three-fifths of a year.

11. Work is the principal cause of absence and non-enrollment, and illness comes next.

Mr. Cooper's chapter on recommendation is well worth study.

FRED D. CRAM
Iowa State Teachers College.

PATTERSON, SAMUEL W. *Teaching the Child to Read.* New York: Doubleday, Doran & Co., 1930. xii + 524 pp.

Professor Patterson's book is a general survey of the field, written as a practical guide for the teacher of reading. Part I, which comprises a fifth of the volume, deals with "the importance and nature of reading." It includes such topics as the evolution of the printed book and modern methods of teaching, and the physiology, psychology and hygiene of reading. The following three parts, which occupy about 400 pages, deal with methods and materials of instruction in the beginning grades, the middle grades and the junior high-school grades, respectively.

Although the first part is well done, the three parts devoted directly to problems of instruction form the most significant as well as the largest portion of the book. Following somewhat the pattern of the latest *Report of the National Committee on Reading* published in 1925, the author has written a treatise which reveals careful study of the recent literature and real aptitude in applying the newer facts to the work of the school. He has not been content merely to discuss all or nearly all the problems, but he has offered what he believes to be the best materials and practices to use in solving them. Indeed, one of the most notable features of the book is the clarity and fullness with which teaching methods are described. The book abounds with lesson plans and records of classroom procedures, which illustrate in full detail the points which the writer wishes to make.

Another feature of the book is the thoroughness with which it is organized for study. Each chapter, as well as each of the five divisions, opens with a statement of the main topics to be discussed and closes with a summary and a series of "Study Problems." The "Study Problems" are unusually abundant and useful. In a typical chapter are included ten or a dozen pages of exercises, classified as follows: A. Discussion Topics; B. Individual Research Topics, and C. Theme Assignments. References to further reading, samples of good and bad practices, instructions for making observations, constructing lessons and the like, as well as fact and thought questions are clearly embodied in the study problems. In addition to these, questions and problems are found at convenient points in the text of the chapter where it appears desirable to encourage the reader to consider the material with special care or to reconsider it in connection with other contexts or issues. The author does the extraordinary thing of putting into practice in the book itself the principles he is enunciating.

Professor Patterson has endeavored to outline in considerable detail a program of teaching reading which incorporates the fruits of both the newer and older investigations and systematic thinking in the subject. Although his sympathy with more recently advanced theories is apparent, he still finds merit in some of the rather formal practices and extrinsic procedures which have ruled the past. In many cases, the author recommends a kind of combination of newer and older practices. If this policy makes the author's general point of view difficult to follow, or, at times, seem inconsistent, it nevertheless outlines a program which, in the reviewer's opinion, is distinctly workable and forward-looking. The context provides an excellent survey of present and past views and practices, and the exercises are well designed to encourage the reader to look ahead for himself.

ARTHUR I. GATES
Columbia University.

OBERTEUFFER, DELBERT. *Personal Hygiene for College Students.* New York: Columbia University, 1930, 121 pp.

To the teacher of personal hygiene this book brings real enlightenment, and it is conceived and formulated in strict accord with modern pedagogies.

Contrasting the logical with the psychological method of presenting a subject and giving cogent reasons for preferring the latter, Dr. Oberteuffer proceeds to investigate the phases of hygiene that are of psychological interest to the student. He asks "What are the curiosities of college students regarding personal health"? and submits the following data:

At the conclusion of a course including the topics: Mental Health, Physical Activity, Nutrition, Professional Health Service, Preventive Disease, Sex and Reproduction, Skin and Hair, Respiration, Elimination, Tobacco and Alcohol, Endocrines, Rest and Fatigue, two thousand students were asked to "List the five ideas, or groups of ideas, of most value to them and to rank their choices in the order of their value."

The replies of the two thousand brought out the fact that 32 percent considered mental health the most important. Physical activity held the second place and the other subjects excited comparatively little enthusiasm, though neither mental health nor physical activity had been particularly stressed by the instructor.

Under each of the twelve topics that comprised the course, the author gave a great number of questions actually asked by the students in his classes. These questions indicated the trend of their thinking and were suggestive to the teacher as a means of arousing interest in some specific point. He found the undergraduate much more concerned with function than with structure and made the necessary instruction of structure incidental to, and growing out of the discussion of function.

He advised against the use of technical terms or of any mannerisms that form a barrier between the teacher and the student that might prevent the student from regarding the matter as pertinent to his personal problems. On the basis that "isolated learning is doubtful learning," it is expedient to connect everything that is told the student with the vital questions aroused in his developing mind by the work in which he lives.

Dr. Oberteuffer used the work complacency in quotations, evidently from a book entitled "Complacency, The Foundation of Human Behavior" and he uses it as indicating a desirable quality. No doubt this represents a particular application of the term and denotes something other than the common, all too common, form of complacency that in many young people is irritatingly associated with gross ignorance and egotism.

While showing himself fully aware that students are not an undifferentiated mass but individuals, one can scarcely read the questions under the heading "Sex and Reproduction" without wondering if some sensitive adolescent might not prefer a private conference with the professor on the reading of a suitable book, to the rather stark discussion of intimacies, that is suggested in the text. Taken as a cross section of the undergraduate mind in its reaction to personal health, however, this book is a very real contribution to the kind of knowledge most necessary to a teacher.

WADE MACMILLAN
Miami University.

STORM, GRACE, AND SMITH, NILA B. *Reading Activities in the Primary*

Grades. Boston: Ginn and Company, 1930. viii + 376 pp.

Those interested in the development of scientific method in education will welcome the appearance of *Reading Activities in the Primary Grades* by Grace E. Storm and Nila B. Smith. Many writers, in attempting to be practical, fail to stress sufficiently the theory underlying the procedures which they suggest. Storm and Smith have made a distinct contribution to the field of primary reading in that they have given a scholarly and scientific presentation of the subject. They have provided for an intelligent interpretation of reading method in the primary grades by giving a background of the history of content and method, the social conditions that have caused changes, and scientific research in reading.

The material is clearly and simply written and is illustrated by many concrete examples. Each chapter is introduced by an outline of the content that follows, and is concluded by a brief concise summary of the main points that have been presented in the chapter. The bibliographies are, for the most part, selective, and presented in the light of the contributions of experimental work in the field of reading.

The content of the book is divided into three parts: Background, Procedure, and Testing and Remedial work. The first decision presents a brief, historical account of the development of reading to its present progressive status, the social conditions that have caused changes, and the influence of scientific investigations upon instruction in reading. The second division gives in illustrative detail, discussions, suggestions and type lessons for reading activities in the kindergarten and each of the primary grades. Equipment and arrangement of the classroom conducive to good reading, phonetic analysis, and seat-work activities related to reading are given adequate consideration. The last division deals with all phases of testing and remedial work in primary reading in a way that should prove the invaluable service to both the teacher and the supervisor. The reviewer regrets the extreme condensation in the historical background and questions some details in method, such as having primary children write out answers to questions (pp. 193 and 195). On the whole, however, the book is probably the most reliable guide that is available.

This textbook meets a real need in college courses in primary reading and in the primary classroom. The organization, the style, and the content combine to accomplish in a large measure the purpose stated by the authors: "to present practical information and methods of procedure in such form that both teachers and supervisors will find it a helpful guide in the study of the problems of the reading class."

CORA M. MARTIN
University of Texas.

NOBLE, M. C. S. *A History of the Public Schools of North Carolina.* Chapel Hill: University of North Carolina Press, 1930. 463 pp.

In both historical and educational literature there are few headings less satisfactorily treated than that of state histories of education. If the demand for such research has been slight, the same is not to be taken as a conclusive nor accurate measurement of the need. Where education is not a national but primarily a local state concern, there is a steadily increasing need that the teaching profession know not only general but also local educational history. This is especially necessary where the

profession is very mobile and where the states differ so greatly in the character of the population, political tradition, economic occupation, and religious temperament. It is therefore an occasion for some rejoicing when a new volume is announced in this general field. One can only regret, perhaps, that Dean Noble's worthy effort was not expended on a state whose history has not already been so comparatively well done as has North Carolina's by Professor Knight.

The present volume traces North Carolina public school history from the beginning down to the twentieth century. A second volume is planned to complete the survey through to the present. While making more original sources available than heretofore, there is very little data or interpretation which appreciably alters the already existing picture of North Carolina educational history. Though there is an absence of extended documentation there is never the feeling that the author could not easily have supplied authentication at any point. But this very virtue is also a shortcoming of the volume. In organizing the narrative about numerous centers where the first hand data naturally clustered, a certain amount of continuity and coherence in the entire volume has been sacrificed. Not only that but another type of data seems to have been slighted. While slavery, agriculture, southern political theory, and church influences are mentioned, their importance as sociological factors conditioning education does not stand out with sufficient effectiveness. Perhaps, too, more color could be given the account by more attention to what was actually going on in the schools and less emphasis on the state viewpoint.

In spite of an excellent start in public support of education before the Civil War, it perhaps can be truthfully said that North Carolina's real progress in education has come in the present century. Of educational development in the "New South" comparatively little is known. We therefore await Dean Noble's second volume with much interest.

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RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

CHAMBERLAIN, LEO MARTIN. "The Housing of Thirty Public Junior Colleges of the Middle West and Tentative Standards and Principles Relating to Buildings, Equipment, and Associated Administrative Problems," *Bulletin of the Bureau of School Service*, III, No. 4. College of Education, University of Kentucky, Lexington, Kentucky, 1931. 210 pp.

Contains a general description of building facilities provided for certain public junior colleges; junior college enrollment, its prediction, and its relation to the housing problem; the relationship of the housing of the junior college to the educational and administrative organization; the relation of the junior college curriculum to the housing needs; special facilities provided by thirty public junior colleges and suggested standards for these facilities; summary and conclusions. Bibliography.

CHUANG, CHAI-HUSAN, *The Institute of Educational Research*, Sun Yatsen University, Canton, China (March, 1930), 17 pp.

This bulletin is in English and gives a history of the Institute, and a discussion of research problems, the Chinese Journal of Educational Research, monographs, the research library, and needs.

HANSEN, ROWNA. *Report Cards for Kindergarten and Elementary Grades*, U. S. Office of Education, Bulletin, No. 41. U. S. Government Printing Office, Washington, D. C., 1931. 24 pp.

An analysis of 628 report cards used in 515 city school systems. The author presents a list of the subjects listed for the elementary schools, the primary grades and the kindergarten. An analysis of schemes for rating pupil behavior is also given.

JONES, H. E., CONRAD, H. S., AND BLANCHARD, M. B. "Environmental Handicap in Mental Test Performance," *University of California Publications in Psychology*, V, No. 3. University of California Press, Berkeley, Cal., 1932. 39 pp.

The problem of this investigation was to determine the nature and extent of the environmental influences upon mental tests performances. From a study of three native white groups the author concludes that a rural child moving to the city would increase his intelligence test scores merely as a result in a change of environmental conditions. The environmental handicap of the rural child is derived chiefly from specific limitations in the material environment and from social differences which achieve expression in linguistic information and skill, in the speed of test performance, and in adaptation to test situations. The handicap is specific, not general.

KUNZIG, ROBERT W. "Public School Education of Atypical Children," Doctor's Thesis in Education, University of Pennsylvania, Philadelphia, Penn., 1931. 160 pp.

Part I contains a discussion of state control in states where there are cities of over 100,000 population: state laws relating to education of atypical children in the public schools; state organization and administration of education of atypical children. Part II contains a discussion of the provision made in cities of 100,000 population: statistics of education for atypical children; administration of classes for atypical children; cost of education of atypical children; and organization of educational facilities for atypical children in selected cities. Bibliography.

MONROE, WALTER S., AND ENGLEHART, MAX D. "A Critical Summary of Research Relating to the Teaching of Arithmetic," *University of Illinois Bulletin*, No. 58, University of Illinois, Urbana, Illinois, 1931. 115 pp.

This bulletin differs from previous ones in this field, first, in that it is limited to research relating to methods of learning and teaching of arithmetic, and second, in that it attempts to effect a systematic and critical evaluation of the researches summarized. The materials are organized around the following topics: introduction; methods of teaching and learning the fundamentals; drill in the fundamentals; methods of teaching pupils to solve verbal problems; methods of diagnosis and remedial treatment; methods of teaching reading of arithmetical subject-matter; motivation; general summary; and conclusions. Bibliography.

MOORE, ELIZABETH SKELDING. "The Development of Mental Health in a Group of Young Children; An Analysis of Factors in Purposeful Activity," *University of Iowa Studies*, New Series No. 207, Vol. IV, No. 6. University of Iowa, Iowa City, Iowa, 1931. 128 pp.

The author has sought to arrive at a clear understanding of certain drives in child behavior, and to increase our knowledge of the effects of differences in child-child, parent-child and teacher-child contacts. The study centers about five aspects of mental hygiene—initiative, creative ability, perseverance, poise, and friendliness—in relation to purposeful activity on the part of the child.

Program of Studies and Standards for Organization of Junior High Schools, Bulletin, No. 5, State of Alabama, Department of Education, Montgomery, Alabama, 1932. 25 pp.

A statement of a program of studies and standards for organization for junior high schools in the state of Alabama.

GATES, ARTHUR I, AND OTHERS. "Psychology of the School Subjects," *Review of Educational Research*, I, No. 5, American Educational Research Association, Washington, D. C. (December, 1931). 125 pp.

Contains a summary of investigations relating to reading, handwriting, spelling, English language, Arithmetic, Social Sciences, Mathematics, Foreign languages, Science Education, Commercial Subjects, Industrial Arts, Fine Arts, Music, and Health. Bibliography.

SANGREN, PAUL V. "Improvement of Reading Through the Use of Tests," Bulletin, *Western State Teachers College*, XXVII, No. 2, Western State Teachers College, Kalamazoo, Mich., 1931. 207 pp.

This bulletin is planned primarily for

classroom teachers and supervisors. It contains a discussion of the following problems: Testing and Teaching Silent Reading; Diagnosis and Remedial Instruction in Silent Reading; Related Problems of Measurement and Instruction in Silent Reading; Review of Existing Standardized Tests and Scales; the Need for more Adequate Standardized Measures in Silent Reading; Informal Tests; Practice Tests; Factors Underlying Development of Silent Reading Abilities; and Critical Study of a Silent Reading Test.

SMITH, ERNEST THOMAS. "Central State Teachers College," *Bulletin of the Central State Teachers College*, Series III, No. 13. Stevens Point, Wis., 53 pp.

Contains data on the graduates of the Department of Secondary Graduation in the Central State Teachers College, Stevens Point, Wisconsin: history of the high-school department, enrollment, student personnel, graduation, occupations followed by the graduates, status of the teaching graduates, personal data concerning graduates, life outcomes of entrants of 1918, and summary and conclusions. Bibliography.

REYNOLDS, ANNIE. *Certain State Programs for the Improvement of Rural School Instruction*, U. S. Office of Education, Bulletin No. 18. U. S. Government Printing Office, Washington, D. C., 1931. 32 pp.

Contains a description of the Minnesota, Missouri, North Dakota, and Idaho programs for the improvement of rural school instruction.

WELLMAN, BETH L., CASE, IDA MAE, MENGERT, IDA GAARDER, AND BRADBURY, DOROTHY E. "Speech Sounds of Young Children," *University of Iowa Studies*, New Series No. 212, Vol. V, No. 2. University of Iowa, Iowa City, Iowa, 1931. 82 pp.

The bulletin contains a statement of the problem, a survey of previous investigations, the method employed in the investigation; the reliability of tests; age and sex differences; the relative difficulty of different sounds; types of errors; interrelations of speech sounds; individual differences; a summary and a bibliography. The authors found that at three years every pre-school child gave correctly 83 percent of the dipthongs, 75 percent of the vowels, 68 percent of the consonant elements, and 52 percent of the consonant blends; while at five years the percentages all closely approached 90.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

CONGDON, WRAY H. "Do Junior College Transfers Succeed?" *Junior College Journal*, II, No. 4 (January, 1932), pp. 209-215.

A study of 258 junior college students entering the college of engineering at the University of Michigan, Ann Arbor, Michigan. The author finds that junior college students have a higher scholastic record than students who enter by other routes.

COOKE, DENNIS H., AND SCHMITZ, BERNARD A. "The Participation of Teachers in the Administration of Small High Schools," *School Review*, XI, No. 1 (January, 1932), pp. 44-50.

A questionnaire study. The author presents a table of percentages of teachers participating in various administrative activities.

FARMER, ERIC. "Present Tendencies in Vocational Selection," *The British*

Journal of Educational Psychology, I, Part III (November, 1931), pp. 246-255.

From a survey of present tendencies in vocational selection the author concludes that vocational selection is a branch of applied psychology, the value of which has already been demonstrated and which is likely to be greatly developed in the near future.

PERSING, ELLIS C. "Science Library for Elementary Schools," *School Science and Mathematics*, XXXII, No. 1 (January, 1932), pp. 65-77.

A book list for the elementary science library.

PHILLIPS, MARGARET. "Professional Courses in the Training of Teachers," *The British Journal of Educational Psychology*, I, Part III (November, 1931), pp. 225-245.

A questionnaire study of the effectiveness of teacher-training courses. Psychology on the whole appears the most important training subject. Methods of teaching special subjects are also regarded as very important by many men. While psychology and principles of teaching courses are held to give some help in the matter of discipline, there is a demand for further help in this respect.

SANDON, FRANK. "The Basis of Marking," *The British Journal of Educational Psychology*, I, Part III (November, 1931), pp. 296-312.

The author concludes that the problem of marking resembles that of finding a prices index number for giving the general trend of fluctuations of correlated prices of diverse articles.

WIRT, HELEN LUCILE. "The Office of the Dean of Girls in the Senior High Schools of California," *California Quarterly of Secondary Education*, VII, No. 2 (January, 1932), pp. 199-217.

A questionnaire study of the office of the Dean of girls in the senior high schools of the state of California.

EXPERIMENTAL STUDIES OF LEARNING AND TEACHING

BILLETT, ROY O. "High-School Pupils' Opinions of the Unit Plan," *School Review*, XI, No. 1 (January, 1932), pp. 17-32.

A questionnaire-checklist study of the opinions of pupils of the unit plan of instruction. The author concludes that each unit should be preceded by a diagnostic test, that pupils should have a greater choice of projects or problems, that individual work period should occupy less time, and that written work should be required only when it is the most economical instrument for attaining mastery, or when it is the goal and not a mere means to the goal.

BRAY, WILLIS J. "A Study of the Achievements of Students of General Chemistry in College," *School Science and Mathematics*, XXXII, No. 1 (January, 1932), pp. 19-29.

A study of the achievement of 320 students in five coöperative colleges in the state of Missouri. Those from the larger high schools seem to score higher on the Iowa Chemistry Training Test than those graduated from smaller high schools; those who had studied chemistry in high school tended to score higher than those who had not studied chemistry in high school; and those who studied biology or general science in high school tended to score lower than the average of the whole group.

BRIGGS, DAVID H., AND JORDAN, A. M. "Influence of the Assignment on Learning," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 659-666.

While the differences are not statistically significant, the data show strong indication of the influence of the assignment.

BURRI, CLARA. "The Influence of an Audience Upon Recall," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 683-690.

Three groups of subjects of twenty each were used in the experiment. The author found that when learning takes place privately the presence of the group at the time of recall is detrimental to the efficiency of production. The anticipation of an audience for recall at the time of learning increases the learning time and, in spite of this, the amount remembered is less when recall occurred before an audience.

DIETZE, ALFRED G. "The Relation of Several Factors to Factual Memory," *The Journal of Applied Psychology*, XV, No. 6 (December, 1931), pp. 563-574.

From a correlation study the author shows the necessity for special attention to vocabulary in reading in secondary school subjects.

DIETZE, ALFRED G., AND JONES, GEORGE ELLIS. "Factual Memory of Secondary School Pupils for a Short Article Which They Read a Single Time," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 667-676.

A continuation of an article begun in the November issue of the *Journal of Educational Psychology*. The authors find that factual memory varies with the material used and familiarity with the article read.

DROBA, DANIEL D. "Effect of Order of Presentation on the Recall of Pictures," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 677-682.

The rank order of correlation between the order of presentation and the frequency of immediate recall for 120 subjects seems to indicate that priority of presentation is not conclusive to such recall.

GILBERT, L. C. "Experimental Investigation of a Flash-Card Method of Teaching Spelling," *The Elementary School Journal*, XXXII, No. 5 (January, 1932), pp. 337-351.

A previous investigation in which the author photographed the eye-movement of 67 good and poor spellers, revealed marked differences in the perceptual habits of good and poor spellers. In this experiment the author reports the results obtained from the use of flash-cards. From five weeks of instruction the experimental group surpassed two control groups in learning efficiencies and in time of study.

HARTMANN, GEORGE W. "The Relative Influence of Visual and Auditory Factors in Spelling Ability," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 601-699.

From a study of 63 college students the author concludes that spelling ability is largely dependent upon one special form of visual reaction and not upon general superiority in any sense, or upon a common integrated capacity.

HUGHES, W. HARDIN. "Progressive Education and the Need for Research," *Educational Method*, XI, No. 4 (January, 1932), pp. 197-201.

The author lists fifteen problems that need special consideration from the point of view of progressive education and research.

HURD, A. W. "Teacher Opinion and Suggestion on Teaching Units in Physics," *School Science and Mathematics*, XXXII, No. 1 (January, 1932), pp. 33-43.

The author reports upon a questionnaire returned by forty-three teachers who had experimentally used a teaching unit in high-school physics.

HURLEY, WILLIAM R. "The Effect of Certain Activities on Scholarship in Junior High School," *California Quarterly of Secondary Education*, VII, No. 2 (January, 1932), pp. 159-165.

A questionnaire study of pupils attending the Longfellow Junior High School at Fresno, California. The author finds that there is a tendency for students who spend the least amount of time in study outside of school hours to receive the lowest average scholarship grade.

KOHLBRENNER J., AND WALKER, LELAND S. "The Effect of Exploratory Mathematics Upon Formal Algebra," *School Science and Mathematics*, XXXII, No. 1 (January, 1932), pp. 48-52.

A comparative study of the effects of exploratory mathematics upon formal algebra. From a comparison of junior high-school pupils with exploratory mathematics, and rural school pupils with formal mathematical training, the author concludes that city pupils do better than rural pupils.

LOWRY, ELLSWORTH. "Improving the Mechanics of Reading," *The Elementary School Journal*, XXXII, No. 5, (January, 1932), pp. 364-368.

The author reports the results of a drill program in grades four to eight.

RUCH, G. M. "Relative Difficulty of the One Hundred Multiplication Facts with Special Reference to Textbook Construction," *The Elementary School Journal*, XXXII, No. 5 (January, 1932), pp. 369-377.

The author brings together in this article, in a comparative way, certain salient facts about three studies, namely those made by Norem and Knight, Clapp, and Fowlkes, upon the learning difficulties of the basic multiplication facts.

WHITE, HUBERT B. "Testing as an Aid to Learning," *Educational Administration and Supervision*, XVIII, No. 1 (January, 1932), pp. 41-46.

The subjects of this investigation consisted of three sections of college students in general psychology. Both the experimental and control groups were given weekly tests. The students in the experimental group were advised to retain their corrected copies of these examinations in preparation for the final examination. The students in the control group were advised to make whatever use they cared to of their corrected copies. The experimental group exceeded the control group in the final examination. This, the author interprets as due to the incentive provided by the definite knowledge of what the final examination was to be. The author compares six measures of student ability with success in classroom teaching. None of the measures predict to any reliable extent success in classroom teaching.

CURRICULUM CONSTRUCTION

GEORGES, J. S. "Mathematics in the scheme of General Education. II. Collection and Classification of Data," *School Science and Mathematics*, XXXII, No. 1 (January, 1932), pp. 57-64.

The author reports upon a study of the extent to which mathematics is used in special subjects, such as, biology, chemistry, economics, geography, geology, physics, psychology, and sociology.

HARAP, HENRY. "Making a Handwriting Course of Study," *Educational Method*, XI, No. 4 (January, 1932), pp. 202-209.

The author discusses six steps in making a handwriting course of study: introductory statement, the determination of objectives, the organization of objectives, the construction of units of work, the introduction of reviews and tests, and adapting instruction to individual differences.

JOHNSON, B. LAMAR. "Adult Reading Interests as Related to Sex and Marital Status," *School Review*, XI, No. 1 (January, 1932), pp. 33-43.

The author reports the results of an investigation of adult reading interests based upon personal interviews in which an inquiry-form were used.

LEECH, DON R. "The Geographical Distribution of High-School Graduates," *School Review*, XI, No. 1 (January, 1932), pp. 51-54.

The author presents data relating to the geographical distribution of 422 graduates of a village high school in central Nebraska. He finds that less than one-sixth of the graduates studied in this investigation remained in the local district.

PUPIL GUIDANCE, ADJUSTMENT AND WELFARE

AUDEN, G. A. "The Maladjusted Child," *The British Journal of Educational Psychology*, I, Part III (November, 1931), pp. 266-278.

The author presents first a typical case of maladjustment, then some theoretical considerations and finally data on the broken home in relation to juvenile delinquency.

MEASUREMENTS, STATISTICS AND METHODS OF EDUCATIONAL RESEARCH

ADAMS, HENRY F. "Measurement in Psychology," *The Journal of Applied Psychology*, XV, No. 6 (December, 1931), pp. 545-554.

The author points out that the physical sciences have produced three fundamental scales of measurement, namely, time, distance, and mass or force, but that experimental psychology has not added a single quantitative law. The author offers suggestions as to fruitful methods of measurement in psychology.

FRANZEN, RAYMOND, AND DERRYBERRY, MAHEW. "The Routine Computation of Partial and Multiple Correlation," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 641-651.

The authors present a simplified form of computing partial and multiple correlation in which the solution is reduced to mechanical routine.

HEVNER, KATE. "A Study of Tests for Appreciation of Music," *The Journal of Applied Psychology*, XV, No. 6 (December, 1931), pp. 575-583.

The author reports the results for a study of certain tests for appreciation of music in which the subject records a pre-

ference for one or the other of two similar versions of the same musical composition.

HOWELLS, THOMAS H., AND JOHNSON, ALLEN A. "A Study of Metre-Sense in Poetry," *The Journal of Applied Psychology*, XV, No. 6 (December, 1931), pp. 539-544.

The authors point out that not every child is able to sense metre in poetry and provides a scale for this purpose.

JOHNSTON, MASON A. "Estimating the Reading Recognition Vocabulary," *California Quarterly of Secondary Education*, VII, No. 2 (January, 1932), pp. 173-177.

A study of the recognition vocabulary of junior-senior high-school pupils. The author finds that the reading recognition vocabulary is approximately eleven per-cent greater than the definitional-recognition vocabulary.

ODELL, C. W. "Further Data Concerning the Effect of Weighting Exercises in New-Type Examinations," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 700-704.

A statistical study of new-type examinations from which the author concludes that weighted and unweighted exercises produce such slight differences that it is not worth the labor to assign such weight.

SHUTTLEWORTH, FRANK K. "A Study of Questionnaire Technique," *Journal of Educational Psychology*, XXII, No. 9 (December, 1931), pp. 652-658.

The author shows that the enclosure of a twenty-five cent piece in a mail questionnaire brought 32.4 percent more replies than the same questionnaire without the coin.

SIMS, VERNER MARTIN. "Essay Examination Questions Classified on Basis of Objectivity," *School and Society*, XXXV, No. 890 (January, 1932), pp. 100-102.

The author indicates three types of questions used in essay examinations: (1) simple-recall questions; (2) short-answer questions; and (3) discussion questions. The author concludes that the difference between essay questions and new type items is not so great as commonly believed, and that the subjectivity of a large part of the traditional examination is not due to the nature of the subject-matter but is seemingly due to such extraneous factors as disagreement as to scoring rules, differences in standards of rating, etc.

STUMPF, FRANKLIN N. "Listening versus Reading Method in True-False Examination," *The Journal of Applied Psychology*, XV, No. 6 (December, 1931), pp. 555-562.

The author offers evidence to indicate that the extra time spent in mimeographing true-false examination papers is not justified.

WHITE, H. D. JENNINGS. "An Application of Mental Tests to University Students," *The British Journal of Educational Psychology*, I, Part III (November, 1931), pp. 279-295.

A report of the application of general intelligence tests to freshmen students at the University College, University of London, and the relation of test scores to achievement.

COOK, GERHARD ALBERT. "The Use of the Iowa Chemistry Aptitude Test in Foretelling Success in High School Chemistry," *Science Education*, XVI (December, 1931), 50-54.

The scores on the Iowa Chemistry Aptitude test are of somewhat less value than I.Q.'s calculated from the Terman Group Test of Mental Ability, for purposes of predicting success in high-school chemistry.

DUNBAR, RALPH E., AND GRANDY, IRVING J. "Chemistry Tests Available for Use in High School Classes," *School Science and Mathematics*, XXXI (December, 1931), 1100-1102.

The authors present a descriptive list of chemistry tests with prices, publishers, etc.

FARNSWORTH, PAUL R., AND MISUMI, ISSEI. "Notes on the Meier-Seashore Art Judgment Test," *Journal of Applied Psychology*, XV (August, 1931), 418-420.

Data are presented on norms, reliability, and relation to intelligence for 212 subjects.

FRISCH, RAGNAR, AND MUDGETT, BRUCE D. "Statistical Correlation and the Theory of Cluster Types," *Journal of the American Statistical Association*, XXVI, New Series, No. 17 (December, 1931), 375-392.

The authors explain what is meant by cluster types, their algebraic interpretation in three variables and N variables, statistical criteria for cluster types, etc.

GUILFORD, J. P., AND GUILFORD, RUTH B. "A Prognostic Test for Students in Design," *Journal of Applied Psychology*, XV (August, 1931), 335-345.

The author presents data relative to the validity and reliability of a line-drawing test in which the subjects were called upon to draw simple lines to express various feelings and attitudes.

IRWIN, J. O. "Recent Advances in Mathematical Statistics," *Journal of the Royal Statistical Society*, XCIV, Part IV (1931), 568-578.

Contains a bibliography of 56 titles and a brief summary of statistical articles appearing during 1930.

NEEL, MARY O., AND MEAD, A. R. "Correlations Between Certain Group Factors in Preparation of Secondary School Teachers," *Educational Administration and Supervision*, XVI (December, 1931), 675-676.

The author finds that the highest correlation with status in student teaching is that of status in a selected group of personality traits.

OLSON, WILLARD C. "The Clinical Use of Behavior Rating Schedules," *The Journal of Juvenile Research*, XV (October, 1931), 237-245.

The author presents the results from an application of the Haggerty-Olson-Wickman Behavior Rating Schedules as applied to twenty-five boys.

PIEPER, CHARLES J. "Research Studies Related to the Teaching of Science," *Science Education*, XVI (December, 1931), 55-65.

An annotated bibliography on research related to the teaching of science.

TILSON, LOWELL MASON. "A Study of the Predictive Value of Music Talent Tests for Teacher-Training Purposes," *The Teachers College Journal*, III (November, 1931), 121 pp.

After presenting an analysis of previous investigations, the author presents data relative to the predictive value of Seashore's test of Musical Talent and the Kwalwasser-Dykema Music Tests, for

each of five test items, namely, pitch, intensity, time, memory and rhythm.

TOUTON, FRANK C. "Research Projects of the Secondary School Level Carried on in California Cities During 1930-1931," *California Quarterly of Secondary Education*, VII (October, 1931), 86-111.

A summary of research projects on the secondary school level carried on in California cities during 1930 and 1931 containing the title of the investigation, persons responsible, nature of the investigation, and findings.

HIGHER EDUCATION

ADAMS, JESSE E. "Experimentation at the College and University Level," *University of Kansas Bulletin of Education*, III, No. 6. Bureau of School Service and Research, University of Kansas, Lawrence, Kansas, (December, 1931), p. 18-31.

Contains a summary of recent experimentation at the college and university level.

CLARK, CARROLL D. "Non-Academic Experiments in Higher Education," *University of Kansas Bulletin of Education*, III, No. 6 (December, 1931), pp. 5-11.

The author reviews various non-academic experiments in higher education, such as, the Worker's Education Bureau of America, the Brookwood experiment, Worker's University; the People's Institute of New York; and the New School of Social Research.

EELLS, W. C. "Bibliography on Junior College," *Junior College Journal*, II, No. 4 (January, 1932), pp. 232-234.

A continuation of the bibliography on junior colleges by Walter C. Eells, United States Office of Education Bulletin, No. 2, 1930.

PIERON, HENRI. "Mental Development and Intelligence (Le developpement mental et l'intelligence)," *L'Education*, No. 2 (November, 1931), pp. 96-100.

A review of Pieron's *Mental Development and Intelligence.*

MISCELLANEOUS PAPERS

LYMAN, R. L. "Summary of Investigations Relating to Grammar, Language, and Composition (January, 1929, to January, 1931)," *The Elementary School Journal*, XXXII, No. 5 (January, 1932), pp. 352-363.

A summary of studies appearing in a bibliography published in the December, 1931, issue of the *Elementary School Journal*, classified and summarized under four general headings: (1) investigations concerning the curriculum, (2) investigations in correct usage, (3) investigations in the field of written composition, and (4) investigations in methods of teaching.

MILES, C. C., AND MILES, W. R. "The Correlation of Intelligence Scores and Chronological Age from Early to Late Maturity," *The American Journal of Psychology*, XLIV, No. 1 (January, 1932), pp. 44-78.

A study of the relationship between intelligence and chronological age from childhood to old age. For the age span from seven to seventeen years, inclusive, the coefficient of correlation was $+0.80 \pm .023$. The correlation between age and score from the age of twenty to ninety-five years is approximately $-0.50 \pm .02$. From the high point in the intelligence score curve, represented at about eighteen years of age, the trend is at first almost

level, then gradually declines dropping fifteen or sixteen mental age months by the chronological age of 50 years.

PIERON, HENRI. "Theoretical and Practical Aspects of the Problem of Intelligence (Aspects theoriques et pratiques du probleme de l'intelligence)," *Revue de Psychologie Appliquee de l'Est*, No. 5, (October, 1931), pp. 117-123.

Pieron discusses the development of intelligence, pointing out the tendency to revert to faculty psychology. After presenting the intercorrelations for general, verbal, logical and numerical intelligence for 564 boys and 389 girls, the author concludes that it is more appropriate to speak of int lligences and suggests the use of a profile. From a theoretical point of view, the author finds that there is no mental unity which possesses the merit of being called intelligence; he does, however, recognize a common factor—a factor of functional success.

MISCELLANEOUS PSYCHOLOGICAL PAPERS

ADAMS, HENRY F. "A Theory of Two Factors: An Alternative Explanation. Part II. Specific Factors," *Journal of Applied Psychology*, XV (August, 1931), 358-377.

From an analysis of concrete materials relating to a series of discrimination tests, the author draws important conclusions relative to Spearman's theory of two factors, identifying the general factor, *g*, with a more inclusive factor, *x*, namely, the standard in terms of which the measurement or evaluation is made.

GARRISON, K. C., AND HOWELL, SUE CRAFT. "The Relationship between Character Trait Ratings and Certain Mental Abilities," *Journal of Applied Psychology*, XV (August, 1931), 378-389.

The authors study the extent to which teachers' ratings are reliable, the relationship between the results obtained from three measures of honesty, namely: teachers' judgments, pupils' judgments, and an objective test, the relation between social and temperamental traits and those classified as mental and active, and traits rated highest and lowest.

HÜBSCH, LISA UND REININGER, KARL. "*Zur Psychologie des Kinderspiels und der Geschlechtsunterschiede im Kindergartenalter* (The Psychology of Play and Sex Differences at the Kindergarten Age)," *Zeitschrift für Angewandte Psychologie*, XXXX (September, 1931), 97-176.

When children in play imitate family life, girls are the leaders. In play, no family is without a child, but no participator likes to be the child, whether boy or girl. Boys prefer technical play, but when they engage in these technical activities, the girls take only passive rôles. Both boys and girls take the same interest in play imitating everyday life and festivals. (E. Appelt, University of Wisconsin)

MÜLLER-FREIENFELS, RICHARD. "*Beiträge zur Rassenpsychologie* (Contributions to Racial Psychology)," *Zeitschrift für Angewandte Psychologie*, XXXIX (June, 1931), 1-31.

The term "race" does not mean only nature, but, to a large extent, color and art. It is erroneous to say that a so-called pure race is more valuable than a mixed one. History shows that all great cultures have been created by mixed races. (E. Appelt, University of Wisconsin)

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Editor Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

School Buildings Yearbook.—The National Society for the Study of Education will issue a yearbook on school buildings in 1934. The personnel of the committee consists of: Homer W. Anderson, Deputy Superintendent of Schools, Denver, Colo.; Ray L. Hamon, George Peabody College for Teachers; Frank W. Hart, University of California; Joseph H. Hixson, Director of School Buildings and Grounds Division, New York State Department of Education; T. C. Holy, Ohio State University; A. B. Moehlman, University of Michigan; John W. Studebaker, Superintendent of Schools, Des Moines, Ia.; and N. L. Engelhardt, Chairman, Teachers College, Columbia University.

The committee will have its first conference at Washington in connection with the meeting of the Department of Superintendence in February, 1932. Dr. Hart of the University of California will preside at this meeting in the absence of the chairman, Dr. Engelhardt, who is spending the spring semester in the study of school buildings in Europe.

Comparative Education.—The seventh yearbook of the International Institute of Teachers College, Columbia University, edited by I. L. Kandel, is devoted to a study of one of the most critical educational problems of the day, the *Expansion of Secondary Education.* Articles are included discussing the problem in the following countries: Argentina, Australia, Austria, Bulgaria, Chile, Czechoslovakia, England, France, Hungary, Italy, Japan, Poland, South Africa, Sweden, and the United States. The article on the United States directs attention to the problem emerging from the relation of economic forces to education. The volume contributes to the theory of secondary education in terms of the development of the democratic concept of education, the implications of the movement for differentiation, and the maintenance of stands in secondary education.

National Survey of the Social Studies.—The Investigation of the Social Studies in the Schools, inaugurated in January, 1929, under the auspices of the American Historical Association, with A. C. Krey of the University of Minnesota as director, is expected to complete its program by December, 1933. The commission in charge represents all of the social sciences, educational research, and administration, fewer than one-third of the members being historians. The work of the investigation is centered around five large problems: objectives, the wishes of society respecting the social studies in the schools, tests, organization of content and methods of instruction, and training of teachers.

The progress made may be summarized as follows:

Objectives: The function of social science in the schools, a basic statement, by C. A. Beard and the Committee on Objectives, approved by the Commission.

Public Relations: The programs of lay organizations with reference to the So-

cial studies in the schools, prepared by Bessie L. Pierce, approved by the Commission.

Tests: Wesley-Gold-Kelty test of ideas, approved in part by the Committee on Tests, ready for use in the fall of 1931.

Marion Clark Tests of Historical Critical Ability—tests for elementary grades, approved by Committee on Tests, ready for use in the fall of 1931.

Parker-Calkins Test of Geographical Understanding, ready for trial.

Other tests in process of construction:

Attitude Scales—L. L. Thurstone

Vocabulary Tests—Mrs. L. C. Pressey

Personality Traits—M. R. Trabue

Historical Mindedness—M. R. Van Wagenen

A fuller statement of the investigation is available in the October, 1931, *Historical Outlook*.

Research Division, N.E.A.—Publications of the Research Division of the National Education Association which have appeared between September 1, 1931, and January 1, 1932, include the following studies:

1. "The Outlook for Rural Education," *Research Bulletin*, Vol. IX, No. 4, September, 1931. This study was issued in preliminary form for the use of conferences on rural education at Los Angeles in June. It is a survey of existing conditions with suggestions for remedial measures.
2. "Teacher Demand and Supply," *Research Bulletin*, Vol. IX, No. 5, November, 1931. This bulletin was first published as the 1931 report of the Committee on the Economic Status of the Teacher. The chief sources of data were state departments of education and state educational associations.
3. "Childhood and the Depression" is a study of the increased responsibilities of the schools due to the depression and of the current critical attitudes toward expenditures for school support.
4. "1931 Supplement to the Bibliographies on Eight Problems of School Legislation." This supplement brings up to date the eight bibliographies published by the Research Division in September, 1930. A complete revision will appear in 1932.

The Research Division has coöperated in an editorial and consultative capacity with regard to the following issues of the *Review of Educational Research*, published by the American Educational Research Association, a department of the National Educational Association:

1. "Special Methods in the Elementary School" is the subject of the October issue. This is the fourth issue of the *Review*. As in previous numbers a bibliography for each chapter was prepared.
2. "Psychology of the School Subjects" is the title of the December issue. This number contains a list of members of the American Educational Research Association.

The Educational Research Service, maintained in coöperation with the Department of Superintendence has issued five circulars since September 1, 1931:

1. "Education Discussed in Lay Magazines, October 1, 1931," Circular No. 8, October, 1931. This summary of articles in non-educational magazines covers the period from June 1 to October 1.
2. "Questionnaire Studies Completed, Bibliography No. 2, 1930-31," Circular No. 9, October, 1931. The list of ninety-seven studies presented in this circular is based on questionnaires submitted to city and state

superintendents of schools since September, 1927, the results of which have been published since September, 1930.

3. "Salary Schedules for Elementary School Principals, 1930-31," Circular No. 10, October, 1931. These schedules are for eighty-eight cities over 100,000 in size.
4. "Education Discussed in Lay Magazines, December 1, 1931," Circular No. 11, December, 1931.
5. "Provisions for Sick Leave and Other Absences of Teachers," Circular No. 12, December, 1931. Sick leave regulations are summarized for 249 cities over 30,000 in population.

Studies now in progress in the Division include a survey of the status of retired teachers based on some 22,000 individual reports, an analysis of the professional and economic status of the superintendent of schools based on some 4,000 reports, a study of methods of estimating state school efficiency, and a report of practice in city school systems in personnel administration based upon replies from some 1,500 cities.

Federal Relations to Education.—The National Advisory Committee on Education, organized in May, 1929, by Secretary Wilbur of the Department of the Interior acting for the President, has filed its final report in two bulletins; Part I presents the committee findings and recommendations, and Part II consists of the detailed data on which the first part is based. The needs of the Committee were financed by a grant of $100,000 provided by the Julius Rosenwald Fund.

The report is concerned with seven fields of educational activity in which the government participates:

1. The education of the people in the several states.
2. The education of persons resident on special federal areas, such as government reservations and federal districts, lying outside the legal jurisdiction of state and other regional governments.
3. The education of the American Indians and other indigenous peoples within the national jurisdiction.
4. The education of the peoples of the territories and outlying possessions.
5. The training of persons in the service of the national government.
6. Scientific research and the collection and diffusion of information regarding education.
7. The intellectual and educational cooperation of the United States with other nations.

Three basic federal policies are recommended:

1. Political control of the purposes and processes of public education shall remain with the state, territorial, or other regional or local governments.
2. Any federal financial support for education in the states shall be given only for education in general and not for special phases of education.
3. The federal government shall be adequately empowered to render intellectual assistance to education everywhere throughout the American domain, whether conducted as a public or a voluntary enterprise.

In keeping with the three policies, an equal number of administrative procedures are prescribed.

1. Maintain and develop local autonomy.
2. Departmentalize and coördinate central management.
3. Emphasize comprehensive research and collection of crucial information.

The governmental organization recommended for carrying out this program is a department of education with a secre-

tary of education in charge, and with the present Office of Education as the nucleus of the new department.

Headquarters of the Committee are at 774 Jackson Place, Washington, D. C.

Fields of Research in 1929-30.—United States Office of Education Bulletin No. 13, 1931, entitled *Bibliography of Research Studies in Education 1929-1930*, includes an interesting tabulation of the number of studies in the various subdivisions of education made during the school year 1929-30.

Ten Years of Research at Columbia.—The *Teachers College Record* for November, 1931, contains a detailed account of the progress made during the first ten years of the existence of the Teachers College Institute of Educational Research with its divisions of educational psychology, field studies, and school experimentation. The accounts include annotated bibliographies of the various studies completed. A fuller statement than here reported of the organization of educational research at Teachers College is found in the January, 1931, number of this department.

Study of the College President.—The Association of American Colleges, under the direction of Archie M. Palmer, in connection with the Association "Study of the Smaller College," is making a

NUMBER OF RESEARCH STUDIES FOR 1929-30 IN VARIOUS FIELDS OF EDUCATION

Subject	Types of Studies					Approximate Percent
	Doctors' Theses	Masters' Theses	City School	Others	Total	
1	2	3	4	5	6	7
Educational history and biography	5	52		15	72	1.50
Current educational conditions—United States	2	27	6	32	67	1.50
Current educational conditions—foreign countries, international aspects	12	35	1	11	59	1.25
Educational theory and practice, special methods, individual differences	12	70	10	65	157	3.50
Educational psychology, child study, etc.	19	49	3	89	160	3.50
Testing and research	10	39	47	118	214	4.50
Special subjects of curriculum	59	606	107	296	1068	23.00
Elementary education, including preschool, kindergarten, and primary	4	22	9	24	59	1.25
Secondary education	12	92	14	67	185	4.00
Teacher training and status	37	145	30	181	393	8.50
Higher education	19	37	2	75	133	2.75
School administration	30	132	17	114	293	6.25
School management	12	165	85	121	383	8.25
School buildings	4	30	8	40	82	1.75
School health and physical education	8	102	19	71	200	4.25
Play, social aspects, and child welfare	8	55	4	28	95	2.00
Rural education	2	60		25	87	1.75
Moral and religious education	15	110	2	40	167	3.50
Guidance	3	48	10	39	100	2.00
Vocational training, including agricultural education, home economics, commercial education, and professional education	19	208	20	75	322	7.00
Civic and military education		13	3	4	20	.50
Education of women	4	23		12	39	.75
Education of racial groups	10	32	4	18	64	1.50
Exceptional children	10	47	13	39	109	2.50
Education extension and libraries	7	60	11	45	123	2.75
Total	323	2259	425	1644	4651	100.00

detailed study of the college president of small liberal arts colleges with an enrollment of less than six hundred students. The investigation covers the duties and functions of the office, personnel data, recent turnover (1929-31), considerations entering into the acceptance of college presidencies, and presidential qualifications sought by boards of control.

Study of Standards.—The study of new standards for institutions of higher education in the North Central Association has been placed in the hands of a committee composed of Dr. Floyd W. Reeves of the University of Chicago, Dean M. E. Haggerty of the University of Minnesota, and President George F. Zook of the University of Akron, chairman. This committee called a conference at Chicago on December 7, 1931, of representatives from approximately sixty institutions which will be visited during the next year by members of the staff. At this conference the members of the staff explained the procedure which will be used in the course of the study.

In brief, the task of the committee is to discover whether it is possible to substitute standards which measure the quality and product of an institution for the standards now in use that in general define the minimum facilities which an institution must have in order to be accredited.

As a part of the investigation the committee will compare the results of its studies at the sixty institutions with the findings of a series of tests which it hopes to provide in the institutions at a later time.

Thus it is hoped that the most dependable standards for higher institutions may be selected and that methods may be devised by means of which they may be easily used for accrediting purposes.

Survey of the Nashville Schools.—The Division of Surveys and Field Studies of George Peabody College for Teachers, Nashville, Tennessee, under the direction of Frank P. Bachman has completed and published a 373 page survey of the Nashville public schools, which covers the school year, 1929-30. The survey staff consisted of Frank P. Bachman, Walter D. Cocking, Sidney B. Hall, Hollis L. Caswell, Lucy Gage, Ray L. Hamon, and N. C. Newbold.

The investigation covers results, opportunities, and teaching procedures in the elementary schools; results, opportunities, and organization in secondary schools; teachers and salary schedules; school buildings; and organization, administration, and finance. The cost of the survey was $27,000 of which the Nashville Board of Education provided $5,000, while the Peabody Division of Surveys and Field Studies and the General Education Board furnished the remainder.

In general, the schools are reported as in poor condition with the causes found in lack of appreciation of the significance of public education and a complacent attitude on the part of the citizens, false economy and inadequate financial support, an antiquated philosophy of education, and the hand of city politics in the schools. Recommendations for improvement involve an immediate increase of $100,000 in the annual instructional cost and an ultimate increase of approximately $750,000 annually. Needed building improvements would cost approximately $6,500,000. It is recommended that the changes be made over a five to ten year period of time.

Rosenwald Fund, 1930-1931.—The Julius Rosenwald Fund, during the year ended June 30, 1931, paid on its programs of philanthropy a total of $2,475,455. The

major part of this expenditure was taken from the capital fund—evidence of the determination of the trustees to carry out the desire of the founder, that the Fund use its principal as well as its income as opportunities for useful work are found. The chief activities for the year were:

Coöperation with southern states and counties in the building of 256 public schools for Negroes, with a teacher capacity of 865 and a pupil capacity of 38,520.

Contributions to Negro high schools and state and private colleges and to other aspects of Negro welfare, especially health.

Demonstrations of pay clinics and of hospital service for persons of moderate means, and studies of the complex and pressing questions of medical economics.

Gifts to a few experiments in general education and child development.

Contributions to the study of social problems, especially in the South, and to the improvement of public administration.

The philanthropist who established this fund died at Chicago at the age of sixty-nine years on January 6, 1932.

Relation between I.Q. and Algebra at Dallas.—Mary L. Thompson, research assistant in the Dallas schools, reports the correlation between the I.Q.'s of 331 I B high-school pupils on the Terman Group Test of Mental Ability and algebra marks to be $+.47 \pm .0327$, product-moment method.

Oakland Testing.—Recent mimeographed research bulletins of the Oakland Department of Research, of which R. E. Rutledge is director, deal with results secured from administering during September, 1931, the Terman Group Test of Mental Ability in the high eighth grade and the Kuhlmann-Anderson Intelligence Test in the low third grade.

Philadelphia Research—Recent mimeographed bulletins of the Division of Educational Research deal with subject-promotion rates in junior and senior high schools and in elementary schools; provisions for individual differences in junior and senior high schools; testing of mental ability; and testing in Latin, English composition, geometry, mechanical drawing, history, handwriting, reading, spelling, and arithmetic.

Michigan Testing Program in October, 1931.—Bulletin No. 142 of the Bureau of Educational Reference and Research, University of Michigan, reports the results of the testing program conducted in the elementary schools of the state during the second week of October, 1931. The tests used were the New Stanford Achievement Test, the Detroit Word Recognition Test, and the Detroit Reading Test (Test 1). The general conclusions are that the pupils tested show results inferior to the scores made in October, 1930, and that, in general, achievement is below the standards suggested by the authors of the tests.

Educational Statistics for 1931.—America's expenditure for education in 1931, as estimated by the United States Office of Education, was $3,200,000,000. The number of pupils enrolled in public elementary schools during the year was approximately 21,211,325; in public high schools, 4,354,815; and in institutions of higher learning, 1,099,468. Private and parochial schools, elementary and secondary combined, enrolled approximately 2,700,000 pupils in 1931. The total number of teachers in the United States is estimated at 1,029,000.

The 1931 elementary-school enrollment was less than that of the estimated elementary-school enrollment for 1930, which

was 21,370,000. Estimated high-school enrollment, however, advanced from 4,030,000 in 1930 to 4,354,815 in 1931.

Because of a decrease in the number of children in the United States under five years of age, there will be appreciable decreases in first-grade enrollments within the next ten years, unless the trend, as indicated by census records, changes. In 1930 there were 128,840 fewer children under five years of age in the United States than in 1920.

Of particular significance in American education during the past year has been the state legislation enacted. A study of educational legislation in the Office of Education, as yet incomplete, reveals considerable important legislation affecting school budgets and expenditures. North Carolina in 1931 inaugurated what is probably the most striking example of state control of local school budgets in the history of the United States. The General Assembly of this state wrote into law the doctrine that "public education is a state function." The Delaware legislature authorized its governor to appoint a State Board of Budget Directors of three members to confer with those who seek state appropriations. These directors are to report their recommendations to the governor. New Hampshire provided for a state budget system and financial control. New Jersey empowered the governing body of a municipality, after a school budget has been twice rejected, to certify the amount necessary for school purposes for the ensuing year. Arkansas strengthened county control of local school budgets.

Enrollment in vocational schools and courses during 1931 totaled approximately 1,125,000 pupils of all ages in evening, part-time, and all-day schools, according to the Federal Board for Vocational Education. The total increase in enrollment for 1931 over 1930 in this type of school exceeded 60,000. From 1918 to 1931, enrollment in all vocational schools federally aided has shown a rise from approximately 164,186 to 1,055,370. Apprentice and part-time coöperative training received considerable attention in the past year. Training of those already employed is growing in practice.

Studies made or received by the Office of Education during 1931 reveal many interesting and important facts regarding the education of colored people. There are in the states having separate school systems, 3,326,482 Negro children of school age. Thirty-two percent, or more than 1,000,000 of these are not in school. Of those enrolled, more than one-third are in the first grade and 74 percent below the fifth grade. Only 3.7 percent of the total are in high school. Research in the three national surveys of education being directed by the Office of Education and studies by the National Association of Teachers in Colored Schools are bringing together vital facts and statistics regarding Negro education in America.

The past year has seen the schools cooperating with the President's Organization on Unemployment Relief to increase school attendance and thus decrease the number of school-age persons competing with adults for employment. A recent report of the Office of Education reveals that increased holding power of schools eliminated from the employment market during the past ten years nearly 700,000 boys and girls sixteen to seventeen years of age.

The president's Organization on Unemployment Relief also has secured the coöperation of many schools, local organizations, and national organizations in aiding communities that are striving to meet the effects of this emergency problem. School lunches and watchful safeguarding

of the nutrition of school children are the means adopted to meet this end.

The White House Conference has been very active during the past year in furthering, by state conferences and dissemination of publications, the health and education of the child. The National Advisory Committee on Illiteracy is making forward steps in promoting literacy by formation of state committees with the coöperation of local organizations.

Regional conferences on homemaking, parent education, rural school supervision, school building problems, and higher education were sponsored by the Office of Education during the past year at the call of Wm. John Cooper, United States Commissioner of Education.

Educational Legislation in 1928-30.—A review of educational legislation enacted in the forty-eight states during 1928-30 reveals that major educational problems in the United States are school finance, teacher certification and pensions, school attendance, curriculum changes, state and county administration, school consolidation, pupil transportation, and education of physically and mentally handicapped children. The study was made by Ward W. Keesecker, Office of Education, specialist in school legislation.

Curriculum changes under recent state laws range from the prohibition of the teaching of the evolution theory in Arkansas public schools and colleges to provision for the teaching of aviation in Tennessee schools. Numerous states now require a study of the United States Constitution; Texas requires a course in national and state constitutions in high schools, teachers colleges and universities, and a study of the American flag is now compulsory in Tennessee public schools. Other subjects authorized to be taught are vocational guidance, public safety, character and physical education, and religious instruction.

School finance held the attention of state legislators in 1929 and 1930 more than any other school problem. The principle that school facilities and school costs should be equalized as far as practicable throughout the state won legislative sanction in approximately one-half of the states.

Recent legislation has changed the composition and function of a few state boards of education, fixing more responsibility for public-school administration upon state school officers. Recent years also have witnessed legislation authorizing counties to vote concerning whether their school districts shall be merged into county-wide systems. It is observed, however, that progress toward county centralization has been slow in states where permissive laws prevail. Alabama, Florida, Kentucky, Louisiana, Maryland, New Mexico, North Carolina, Tennessee, Virginia, and Utah now have fairly well developed county unit plans. The county unit plan is partially developed in Arkansas, California, Georgia, Minnesota, Mississippi, Montana, Ohio, Oregon, South Carolina, and Texas.

Laws increasing qualifications of county superintendents were enacted in Montana, North Carolina, and Wisconsin during the biennium and legislators in Minnesota, Missouri, Montana, North Carolina, Texas, and Pennsylvania voted to increase salaries of county superintendents in their respective states. Mississippi provided for assistants to county superintendents and also authorized employment of county supervisors of primary work. Furthermore, by authorizing the consolidation of two or more adjacent districts, legislatures gradually are vesting local control of schools in larger administrative units.

Twenty-five states gave legislative attention to teachers' pensions in 1929 and 1930, endeavoring in the main to improve retirement systems already established. State commissions to study teachers' retirement problems were appointed in Delaware, North Dakota, and Michigan. Extension of teacher retirement so as to include other school employees was made legal in California, Colorado, New Jersey, and West Virginia. Vermont increased the minimum retirement allowance to $200 per annum, and retirement for teachers in districts, annexed to cities having retirement systems, was granted in Wisconsin.

State-wide teacher pension systems now operate in Arizona, California, Connecticut, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, District of Columbia, Alaska, Hawaii, and Porto Rico. Approximately one-third of the forty-eight states have pension systems applicable only to certain cities or districts.

Legislation to promote increased school attendance has been enacted in a number of states since 1928, providing for longer terms, additional qualifications for labor permits, lower compulsory school attendance ages, transportation of pupils, and free tuition. Alaska passed a law requiring school attendance at seven years of age instead of eight. Oregon now requires attendance at eight years instead of nine. The annual school term in Maine has been extended from thirty weeks to thirty-two weeks, and Missouri requires completion of the sixth grade for employment during school hours. Children must now complete elementary school for labor permits in Maryland, instead of only the fifth grade. A commission to study the problem of increasing school attendance, especially of employed minors, was authorized in Massachusetts legislation.

Arkansas, California, Colorado, Idaho, Iowa, Kansas, Kentucky, Minnesota, New Jersey, New York, North Dakota, Oregon, South Carolina, Texas, and Wisconsin enacted legislation during the two years to promote school attendance by providing for free tuition in other school districts or transportation of pupils.

The practice of legislatures in providing for educational surveys before enacting legislation pertaining to schools continued unabated during the biennium.

Study of the Small College.—Since the initiation a year ago of the study of "The Smaller College" 114 members of the Association of American Colleges have expressed a desire to participate in this undertaking. For the purposes of the study "the smaller college" is defined as a liberal arts college enrolling not more than six hundred students. A few colleges with more than six hundred students are voluntarily coöperating in the investigation.

The detailed topics covered in the study were listed in the April, 1931, number of this department. There remains yet to be obtained certain information on the physical plant and on financial and fiduciary practices, which will be gathered during the latter part of 1931. In addition, intensive studies are being conducted on the government and internal administration of the colleges, with particular reference to the offices of the college president and of the college dean.

Ohio State Research.—The *Educational Research Bulletin* for September 16, 1931, comprises the annual report of the Bureau of Educational Research at Ohio

State University. It includes a detailed statement of the service and research activities of the several divisions of the Bureau: Appointments, Reference, Editorial, Accomplishment Tests, Personnel, Survey, and Curriculum Studies, as well as a list of recent publications of the Bureau.

Ohio State Conference Proceedings.—A summary of the addresses delivered at the general sessions and sectional meetings of the Ohio State Educational Conference, held last April 9-11, has appeared in the form of a 544 page volume as *Ohio State University Bulletin*, Vol. XXXVI, No. 3, under the editorship of Josephine MacLatchy.

Oakland and Sioux City Testing.—For the past several semesters a survey test has been given each year in the secondary schools of Oakland, California, the subject surveyed being chosen by the Secondary Principals' Conference and the choice approved by the assistant superintendent in charge of secondary schools. In the school year 1928-29 standardized tests were given in all the Spanish classes of the city; in 1929-30 a study was made of the work in algebra in the high ninth grade; and in 1930-31 the conference requested that an investigation be made of the work being done in plane geometry in the various senior high schools. For the survey the Columbia Research Bureau Plane Geometry Test was chosen. A recent mimeographed bulletin of the Oakland Department of Research and Auxiliary Agencies reported the results secured. A mimeographed bulletin issued in September, 1931, reports the results of the Kuhlmann-Anderson Intelligence Test and the Stanford Reading Test in the high sixth grade, administered during the spring semester, 1931.

General Circular No. 13, 1931, of the Sioux City Schools, Iowa, reports results secured from administering the New Stanford Achievement Test in the sixth, seventh, and eighth grades and from group intelligence tests in the second, fourth, fifth, and tenth grades.

Long Beach Department of Research. The research department of Long Beach, California, was organized in 1918 with the present director, Ernest P. Branson, in charge. His instructions were to survey the schools with standardized tests, to encourage the scientific attitude, and to furnish teachers with standards by which they might evaluate their own work as instructors.

For a year and a half the director taught half-time. For two years he had neither desk nor office. Nevertheless, sixteen thousand survey tests were used in the first year. The growth of the departmental staff began with the coöperation of the psychologist, who with her present assistant, works out from the research office. In addition to these three persons there is an assistant in charge of administrative research, one in charge of high school and college testing and research, one in charge of similar work in elementary and junior high schools, and one in charge of counseling and guidance. Two visiting teachers and three clerks complete the staff. In 1924 counseling was established as a function of the department, the staff of counselors now consisting of four in the high school and college field, seven in the junior high schools, and seven in the elementary schools. A well aranged office suite houses the central office staff. Hollerith tabulating machines and electric calculators are a part of the office equipment. The library contains a number of professional books

and an extensive collection of pamphlet literature indexed for easy reference.

Standardized tests still are used extensively but they are now supplemented by tests made locally to fit local courses of study. Research, aside from testing, takes a larger proportion of the time each year. The last school bond issue was planned as a result of an extensive survey of pupil distribution and population growth. At the present time a study of junior high school plants and equipment is being made in order to forecast the cost of a possible change to the 6-4-4 plan of organization. Junior-college classification has been changed in order to try a plan which will take into account the scores on intelligence and achievement tests as well as the number of recommending high-school marks. Newspaper publicity, occupations of high school graduates, and sick leave of teachers are examples of other studies made recently. Statistics are gathered in a routine way on such subjects as pupil failure, professional study by the certificated staff, acceleration and retardation, and counselors' monthly reports. In the field of guidance a noteworthy undertaking has been the publication of a cumulative record packet to be installed in the first grade and carried through the high school. The state's traveling child guidance clinic has been called in to assist with the guidance of problem cases. A clinic for the guidance of children who present behavior problems has been organized with the assistance of the school physician.

Testing Program in Beaumont, Texas.—The testing program followed during the school years 1929-1931 is practically the same as in previous years with only a few changes for the last year. Intelligence tests were given to beginners at the opening of school, and to the lowest levels later on. These were administered for the purpose of classification. The Otis Primary Test was given to the second grade at the close of this year. In 1931, in addition to the former years' testing program, intelligence tests were given to the second-grade pupils as they were advanced to the departmental grades of the elementary school. Departmentalization begins with the third grade in Beaumont. Pupils are segregated into fast, average, slow and special-room groups, thus giving each child a place in the group to which his ability entitles him.

In the case of the beginners who took the intelligence test, a second test was given to those who seemed not to be assigned to the right group. Informal tests were administered at the lowest level two and sometimes three times. These tests were based on drill cards in reading and arithmetic that had been prepared by the teachers. These cards were found very helpful in raising the standard of the slow group.

Achievement tests were given at the end of the first semester to every child from the second to the fifth grade inclusive. To give these tests at this time makes it possible to classify pupils more carefully than in the rush of the fall opening and provides an opportunity to do remedial work before the close of the year. Achievement tests are given to pupils leaving the fifth grade for junior high school. Intelligence tests are given to these same pupils at the opening of school for the purpose of providing a better classification as they enter the junior high school. In 1931, the Stanford Achievement Tests also were administered in the junior and senior high schools.

The Stanford Achievement Tests were used in their revised form. Both primary and advanced tests were given. Results are tabulated according to chronological

ages rather than by grades because in this way results are more comparable. Chronological ages mean the same things for all pupils of the same age, while the term, grade, has a different meaning in different schools. The tests always are given to an entire grade or grades at the same time by the same person. In this way, tests are administered under uniform conditions in all schools. Teachers score their own tests and thus become acquainted with the weaknesses of their own classes and of individual pupils. In this way teachers are better able to determine remedial plans to be used. Pupils make and study their own profiles on the tests, often taking the records home to their parents who are able to acquaint themselves with the progress of their children.

New Periodical.—The American Association of Teachers Colleges, with the September number, began publication of a *Quarterly* to serve as its official organ. The chairman of the board of editors is E. J. Ashbaugh of Miami University with the editorial office at the same institution, Oxford, Ohio.

Society of Curriculum Specialists.—The third periodic bibliography of the Society deals with curriculum making from March, 1930, to March, 1931. The bibliographer of the Society is Henry Harap of Western Reserve University. The fourth News Bulletin under date of September 28, 1931, contains a report of important curriculum projects in public schools.

The output of the year indicates that there has been no diminution in activity in the curriculum field. Several general works of customary book-size on the curriculum appeared during the year. This is a good index of general interest in the movement. Of particular significance is the inclusion of the curriculum as one of fifteen major fields of research to be reported periodically in the *Review of Educational Research.*

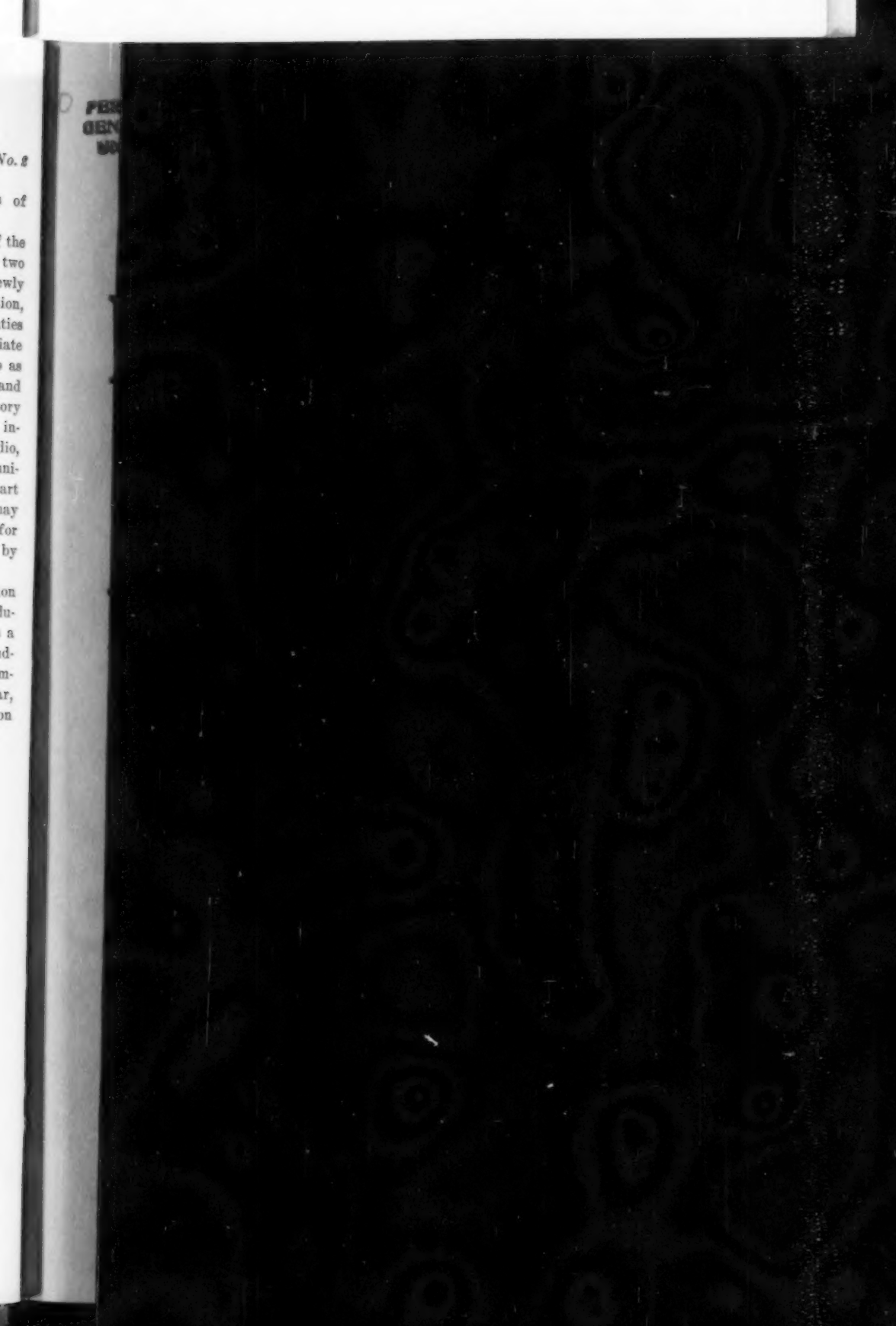
Investigations of curriculum objectives, which constitute the special research contribution of the curriculum movement, show a considerable gain over the output of the preceding year. This is perhaps the most promising development of the year. Language and teacher training were most extensively investigated. As yet there appears to be no evidence of a decline in interest in curriculum making.

New Specialists in Office of Education.—Ray Lyman Wilbur, Secretary of the Interior, has announced the appointment of Dr. David Segel, Long Beach, California, to the position of specialist in educational tests and measurements in the research and investigation division of the United States Office of Education. Creation of such a position was authorized by the last Congress.

It will be the duty of the new specialist to conduct studies concerned with the construction and evaluation of tests and measures of pupil progress, efficiency of teaching, and adequacy of the school program; to administer measurement programs, interpret results, make administrative adjustments and curriculum changes based on results of testing programs; and to coöperate with bureaus of research in city school systems, other research agencies, and individuals in making studies in this field. He also will organize and conduct an information service for school officers and others interested in problems of tests and measurements, advise and assist school officers in surveys or studies of school systems, and coöper-

ate in such surveys conducted by the Office of Education.

Dr. Alina M. Lindegren, for the past three years instructor in medieval history and modern European history at State Teachers College, Superior, Wisconsin, has been appointed to the foreign school systems division of the Office of Education as specialist in Western European school systems. Her chief duty will be to prepare for publication in English, from the original data written in the language of the given country, bulletins, circulars, and articles on education in the Western European countries, particularly the Germanic-language countries. She will assist in maintaining constant contact with educational movements in those countries, and in collecting and keeping adequate documentation about such changes. Study also will be made of foreign school systems. She will aid college registrars and committees of admission in the United States to evaluate credentials of students from the Germanic-Scandinavian countries, and will make comparative studies in order more accurately to determine the status of such students.

Cline M. Koon, assistant director of the Ohio School of the Air for the past two years, has been appointed to fill the newly created post in the Office of Education, Specialist in Education by Radio. Duties of the new specialist will be to initiate and conduct research studies of radio as an educational agency, to organize and maintain an informational and advisory service to schools and other agencies interested in the field of education by radio, to become familiar with college and university extension work so that the part radio as a tool will play in this field may be evaluated, and to prepare material for publication on phases of education by radio.

Creation of the radio-specialist position recognizes the growing importance of education by radio. It was authorized as a result of many recommendations, including one of the National Advisory Committee on Education by Radio last year, which stressed the need of such a section in the Office of Education.